

TM 3-4240-207-35

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

FIELD AND DEPOT MAINTENANCE MANUAL

**FILTER UNITS
GAS PARTICULATE
300 CFM, GED, ABC-M6
AND
300 CFM, EMD, ABC-M6
(END ITEM CODES 556 AND 559)**

HEADQUARTERS, DEPARTMENT OF THE ARMY

AUGUST 1961

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TECHNICAL MANUAL
No. 3-4240-207-35

HEADQUARTERS,
DEPARTMENT OF THE ARMY
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Field and Depot Maintenance Manual
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*This manual together with TM 3-4240-207-12, 17 August 1961, supersedes TM 3-420, 27 July 1956, including C 1, 1 May 1958.



CHAPTER 1

INTRODUCTION

1. Scope

This manual is published for the use of field (fourth echelon) and depot (fifth echelon) maintenance personnel. It is intended to be used in conjunction with TM 3-4240-207-12. Third echelon maintenance is limited to that authorized at second echelon. The repair parts and special tools list for field and depot maintenance is published in TM 3-4240-207-35P.

a. Chapter 2 contains maintenance instructions for field maintenance personnel. Fourth echelon maintenance consists of the removal, disassembly, inspection, maintenance, assembly, and installation of those components which are authorized by the maintenance allocation chart (app. II, TM 3-4240-207-12.)

b. Chapter 3 contains maintenance instructions for fifth echelon personnel. Fifth maintenance consists of the adjustment, repair, and replacement of all components of the unit and the assembly of these components so as to constitute a complete overhaul of the entire filter unit.

c. The maintenance allocation chart is contained in appendix II, TM 3-4240-207-12.

2. Appendix

The appendix contains a list of current references.

3. Record and Report Form

The forms listed below will be used in conjunction with the ABC-M6 filter unit.

a. DA Form 468 (Unsatisfactory Equipment Report).

b. DA Form 478 (Organizational Equipment File).

c. DA Form 811 (Work Request and Job Order).

d. DD Form 110 (Vehicle and Equipment Operational Record).

4. Tabulated Data

a. Dimensions and Weights

Overall length	34 in.
Overall width	24 in.
Overall height	39 in.
Weight, crated	700 lb.
Weight, uncrated	400 lb.
Cubage, unit crated	37.1 cu. ft.
Floor space required	5.8 sq. ft.

b. Classification and Ratings.

(1) Gasoline engine.

Horsepower	1 1/2
Type	Single-cylinder, L-head, air-cooled, 4-cycle.
Ignition	High-tension; built-in flywheel magneto, moisture-proof and dustproof.
Lubrication	Positive lubrication by splash system.
Carburetor	Concentric float; idle- and power-mixture adjustment.
Bearings	Ball bearings on drive side; steel-packed babbitt-lined bearing with oil seals on magneto side.
Governor	Air-vane type, controlled by adjustment of thumb-screw.
Crankshaft	Counterweighted; integral helical camshaft drive gear.
Valve	Forged steel intake valve; austenitic steel exhaust valve.
Rated speed	2,600-3,600 r.p.m. Standard setting (on load). 3,300 r.p.m.
Starting	Manual; rope on starting pulley.
Spark plug gap	0.025 in.

Magneto breaker
 point gap ----- 0.020 in.
 Net weight ----- 35 lb.
 Weight, domestic
 shipping ----- 45 lb.
 Fuel tank capacity ----- 3 qt.
 Fuel consumption ----- 1/2 pt./hr.

(2) Electric motor

Horsepower ----- 1
 Voltage ----- 115/230
 Cycles ----- 60
 Phase ----- Single
 Current ----- Alternating
 Rating ----- Continuous
 Amperage ----- 10.8/5.4
 Rated speed ----- 3,450 r.p.m.
 Lubrication ----- Sealed bearings
 Degree of inclosure ----- Fully inclosed
 Bearings ----- Sealed bearings with oil-seal gaskets
 Starting ----- Capacitor start, equipped with centrifugal switch
 Rotation ----- Counterclockwise

c. Recommended Wrench Torque for Steel Nuts and Bolts.

Fine thread series		Coarse thread series	
Nut or bolt size	Torque (pound-inches)	Nut or bolt size	Torque (pound-inches)
8-36	12-15	8-32	12-15
10-32	20-25	10-24	20-25
1/4-28	50-70	1/4-20	40-50
5/16-24	100-140	5/16-18	80-90
3/8-24	160-190	3/8-16	160-185
7/16-20	450-500	7/16-14	235-255
1/2-20	480-690	1/2-18	400-480
9/16-18	800-1,000	9/16-12	500-700
5/8-18	1,100-1,800	5/8-11	700-900
3/4-16	2,800-2,500	3/4-10	1,150-1,600
7/8-14	2,500-3,000	7/8-9	2,200-3,300
1-14	3,700-5,500	1-8	3,750-5,000

d. Table of Limits, Gasoline Engine.

Description	Manufactured tolerance	Maximum allowable limit
Main bearing to crankshaft:		
Magneto bearing	0.8764 to 0.877 in.	0.878 in.
Drive bearing	0.8764 to 0.877 in.	0.878 in.
Crankshaft end play		0.002 to 0.008 in.
Connecting rod bearing to crankpin.		0.0045 in.
Piston to cylinder wall	0.0015 in.	0.007 in.
Valve guide, top to top cylinder:		
Intake	5/8 in.	5/8 in.
Exhaust	1 in.	1 in.
Valves:		
Angle of seat:		
Intake	45°	45°
Exhaust	45°	45°
Width of seat:		
Intake	0.047 to 0.062 in.	0.08
Exhaust	0.047 to 0.062 in.	0.08
Tappet clearance:		
Intake	0.007 to 0.009 in.	0.009 in.
Exhaust	0.014 to 0.016 in.	0.016 in.
Spark plug gap	0.025 in.	0.025 in.
Piston ring:		
End gap	0.007 to 0.017 in.	0.026 in.
Side clearance in groove		0.0025 to 0.004 in.
Magneto:		
Armature air gap	0.002 to 0.012 in.	0.012 in.
Breaker point gap	0.020 in.	0.020 in.
Condenser capacity	0.16 to 0.24 mf.	
Primary coil winding	0.95 ohm	

Description	Manufactured diameter	Maximum allowable out-of-round
Main bearings	0.877 to 0.8764 in.	0.007 in.
Cylinder bore	1.9990 to 2.000 in.	0.0015 in.
Connecting rod:		
Crankpin hole		0.007 in.
Piston pin hole		0.007 in.
Piston pin		0.005 in.

Description	Minimum allowable diameter
Crankshaft:	
Magneto journal	0.8736 in.
Drive journal	0.8736 in.
Crankpin	0.747 in.
Camshaft	0.37185 in.
Connecting rod:	
Crankpin hole	0.751 in.
Piston pin hole	0.49125 in.
Piston pin	0.48875 in.

Description	Manufactured diameter	Maximum allowable diameter
Cylinder bore	1.990 to 2.000 in.	2.003 in.

CHAPTER 2

FIELD MAINTENANCE INSTRUCTION—FOURTH ECHELON

Section I. BLOWER GROUP

5. Description

The blower consists of a fan mounted in a housing which is fastened directly to the engine on gasoline-engine-driven filter units or to the motor base on electric-motor-driven filter units. The fan is connected directly to the engine or motor shaft. The blower and engine or motor may be rotated on the swivel base so that the blower inlet or outlet is correctly aligned for either inside or outside installation.

6. Functioning

The turning of the fan by either the gasoline engine or electric motor moves air through the canister to be purified at a rate of 300 cubic feet per minute. The blower is connected to push air through the canister when installed outside and to pull air through the canister when installed inside.

7. Removal

The blower must be disassembled as outlined in paragraph 8 before it can be removed from the unit. However, the blower and engine or motor may be removed as a single unit (par. 29c).

8. Disassembly

a. Remove four screws (17, fig. 1) fastening tube (16) to blower air outlet. Slide tube from outlet and separate locking coupling (15) from tube.

b. Remove 11 machine screws (12) and nuts (8) which fasten left and right casing (11 and 4) together. Lift off left casing.

c. Disconnect fan (6) from engine or motor

shaft by removing nut (9) and washer (8). Using a suitable puller, remove fan from shaft. Remove woodruff key (7).

d. Remove four screws (5) fastening right casing (4) to mount (1). Lift off casing.

e. Remove four bolts (2) fastening mount (1) to gasoline engine or electric motor base.

f. Remove four screws (10) fastening left casing (11) to adapter (13). Remove gasket (14) from adapter.

9. Inspection and Maintenance

a. Clean all metal parts of blower unit with dry-cleaning solvent.

b. Inspect all connection points for nicks, cracks, scoring, or other damage that will keep the connections from being airtight. Replace any damaged parts. Make sure that the fan is not cracked or otherwise damaged and that it rides evenly on the shaft. If the fan is damaged, replace it. Make sure that the key fits snugly in the keyway. If the key is partially sheared or damaged, replace it.

10. Assembly and Installation

a. Place gasket (14, fig. 1) in adapter (13) and fasten adapter to left casing (11) with four screws (10).

b. Fasten mount (1) to engine or motor base with four bolts (2).

c. Fasten right casing (4) to mount with four screws (5).

d. Coat all metal-to-metal connections on the left and right blower casings with gasket cement.

e. With engine (motor) positioned correctly, place keyway of drive shaft up and place woodruff key (7) in keyway. Place fan (6) on drive shaft and align keyway of fan with key. Using a soft-faced hammer, tap fan securely in place.

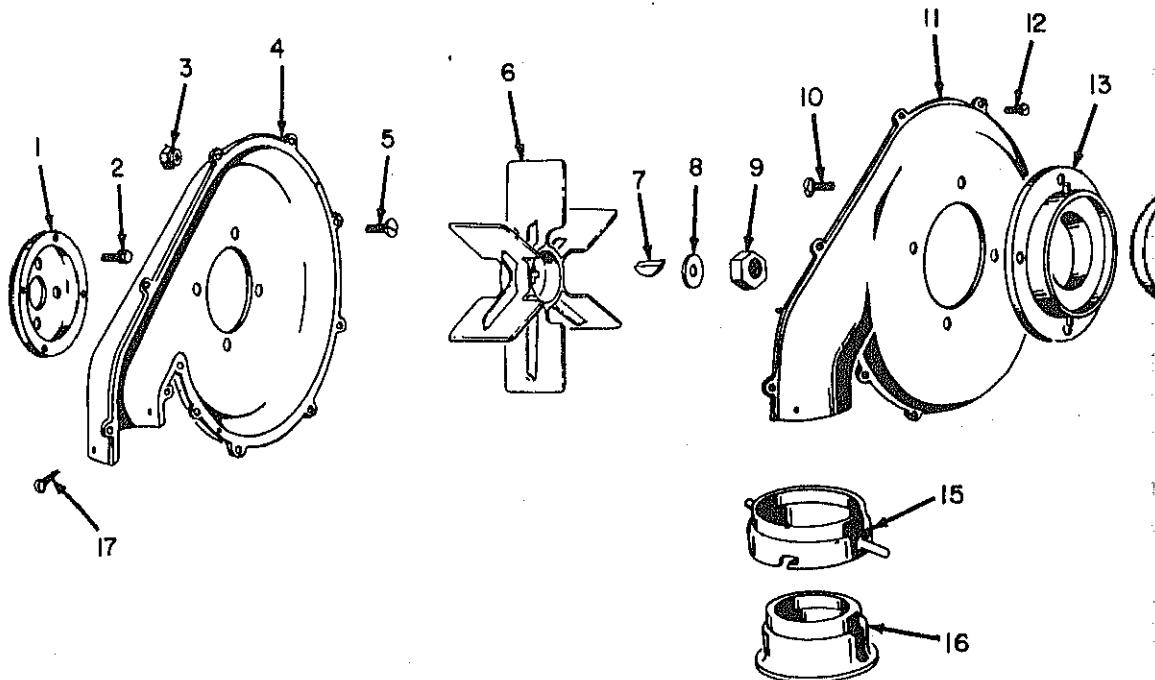


Figure 1. Blower group, exploded view.

Fasten fan on drive shaft with washer (8) and nut (9).

f. Place left casing (11) on right casing. Fasten left and right casings together with 11

machine screws (12) and nuts (3).

g. Slide tube (16) through locking coupling (15) and insert tube in blower air tube. Fasten tube with four screws (17).

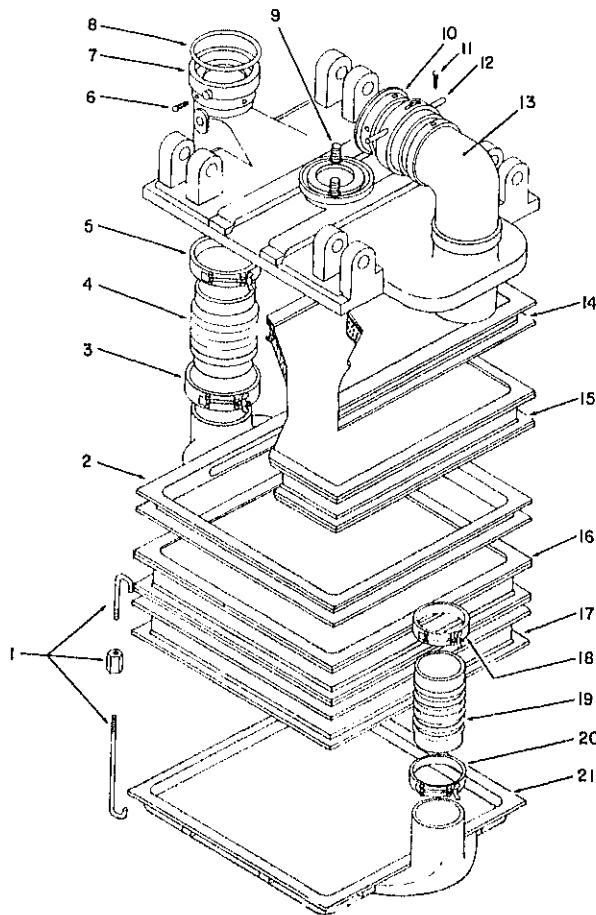
Section II. CANISTER GROUP

11. Description and Functioning

Description and functioning of the canister group are described in TM-8-4240-12.

12. Tests

Test canister (TM 3-4240-207-12.)



- 1 Turnbuckle
- 2 Intake manifold
- 3 T-bolt clamp
- 4 Air duct hose
- 5 T-bolt clamp
- 6 Drive screw
- 7 Intake manifold connector
- 8 Gasket
- 9 Bolt
- 10 Locking coupling tube
- 11 Drive screw
- 12 Locking coupling
- 13 Elbow coupling
- 14 Gas filter
- 15 Particulate filter
- 16 Particulate filter
- 17 Gas filter
- 18 T-bolt clamp
- 19 Air duct hose
- 20 T-bolt clamp
- 21 Bottom manifold

Figure 2. Canister group, exploded view.

13. Removal

a. Remove air inlet and outlet groups (TM 3-4240-207-12.)

b. Remove elbow coupling (13, fig. 2). If elbow coupling is connected to blower air inlet, first unlock locking coupling (12) by turning counterclockwise.

14. Disassembly

a. Remove eight turnbuckles (1, fig. 2), which fasten manifolds and filters together, by loosening turnbuckles nuts.

b. Loosen four T-bolt clamps (3, 5, 18, and 20) which fasten two air duct hose (4 and 19).

c. Extend (four) retractable carrying handles (17, fig. 3) and carefully lift top manifold (15) and engine (motor). Place on wooden blocks being careful not to dent or scratch manifold surfaces.

d. Remove two air duct hose and four T-bolt clamps.

e. Lift off filters and intake manifold in the following sequence: gas filter (14, fig 2), particulate filter (15), intake manifold (2), particulate filter (16), and gas filter (17).

f. Remove four cotter pins (16, fig. 3) from carrying handles (17).

g. Remove carrying handles from top manifold.

h. Remove two sliding bolts (9, fig. 2) from swivel base.

i. Remove gasket (8) from intake manifold connector (7) with a screwdriver.

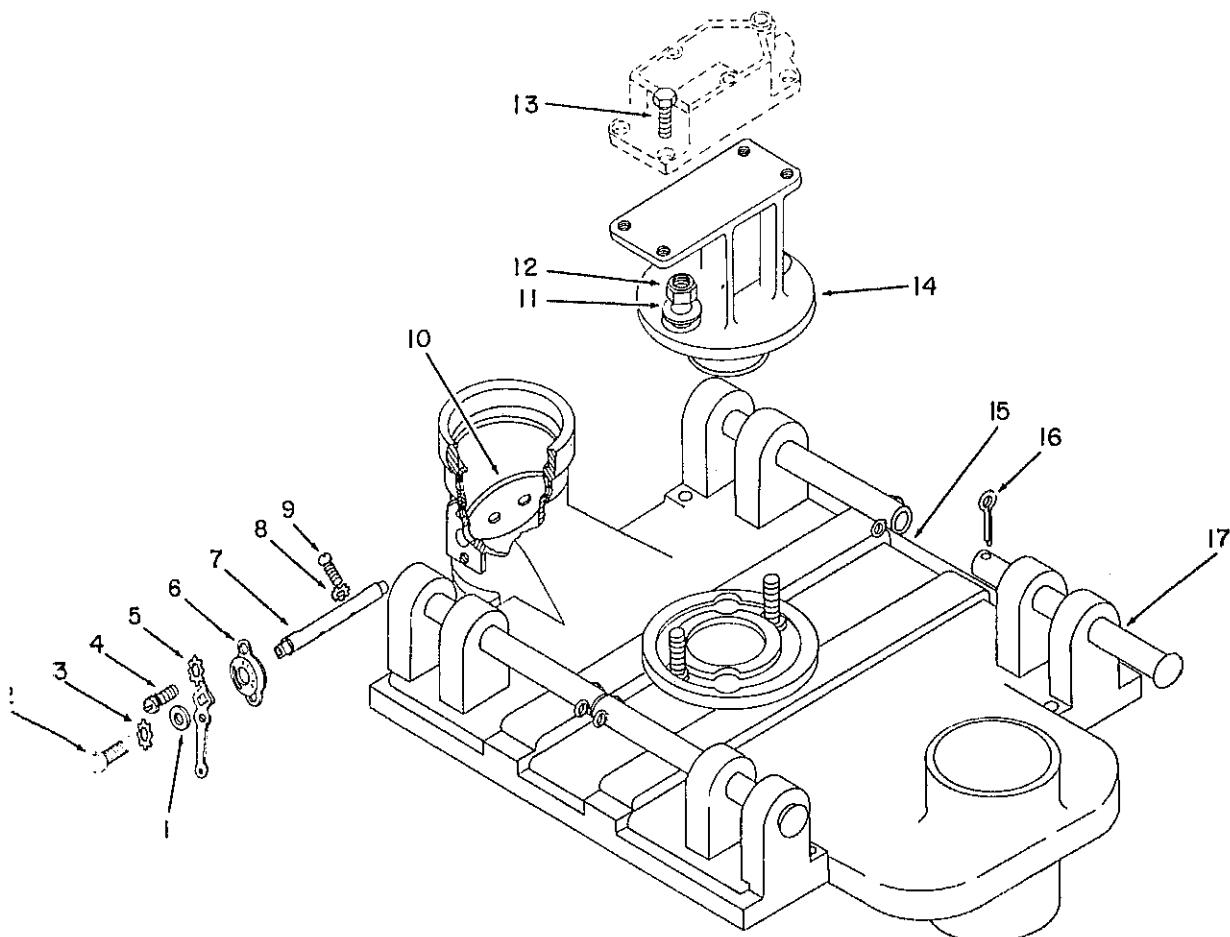
j. Remove four drive screws (6) that hold intake manifold connector (7) to canister air inlet. Remove intake manifold connector.

k. Loosen damper control screw and rotate handle of damper control quadrant (6, fig. 3) clockwise until flue damper (10) is horizontal and remove two machine screws (9) and lockwashers (8). Remove flue damper.

l. Remove two machine screws (4) and lockwashers (5) that hold damper control quadrant (6) to the air inlet. Remove damper control quadrant and shaft (7).

m. Separate control handle from quadrant and shaft by removing machine screw (2), lockwasher (3), and flat washer (1).

n. Remove four drive screws (11, fig. 2) that hold coupling tube (10) to elbow



1 Washer	10 Flue damper
2 Machine screw	11 Washer
3 Lockwasher	12 Self locking nut
4 Machine screw	13 Assembled washer bolt
5 Lockwasher	14 Engine stand
6 Damper control quadrant	15 Top manifold
7 Shaft	16 Cotter pin
8 Lockwasher	17 Carrying handle
9 Machine screw	

Figure 8. Canister group, exploded view.

a. Separate locking coupling tube (10), locking coupling (12), and elbow.

15. Inspection and Maintenance

a. Do not clean filters; tests outlined in TM 3-4240-207-12 will determine their serviceable. Clean all metal parts with dry-clean-

ing solvent, and wash air duct hose with a mild solution of soap or detergent. Dry with compressed air.

b. Make certain that dirt or foreign matter has not entered air intake manifold (2, fig 2), bottom manifold (21) or top manifold (15, fig. 3). Remove any obstructions.

c. Remove old gasket cement from intake manifold connector (7, fig. 2), air inlet, locking coupling tube (10), and elbow.

d. Inspect air duct hose for tears, holes, punctures, chafing, and worn edges. Check all parts for signs of wear or damage. Replace if necessary.

16. Assembly

a. Coat mating surfaces of locking coupling tube (10, fig. 2) and elbow with gasket-forming cement.

b. Slide coupling (12) over coupling tube (10) so that locking slots of coupling face flanged end of tube.

c. Slide locking coupling tube (10) into recessed end of elbow. Aline four holes and secure with drive screws (11).

d. Assemble damper control quadrant (6, fig. 3) and shaft (7) with machine screw (2), lockwasher (3), and flat washer (1).

e. Insert shaft (7) through hole in air inlet and position damper control quadrant (6) so that slot is located left of and below the shaft. Secure with two machine screws (4) and lockwashers (5).

f. Position flue damper (10) and secure to shaft with screws (9) and lockwashers (8).

g. Cement new gasket (8, fig 2) in recess of intake manifold connector (7) with gasket-forming cement. Coat mating surfaces of manifold connector and air inlet with cement.

h. Position intake manifold connector (7) over air inlet so that locking studs are perpendicular to shaft (7, fig. 3). Secure with four drive screws (6, fig 2).

i. Slide four carrying handles (17, fig. 3) through mounting studs on top manifold. Insert cotter pin (16) through end of each handle.

j. Place filters and intake manifold on bottom manifold (21, fig. 2) in the following sequence: gas filter (17), particulate filter (16), intake manifold (2), particulate filter (15), and gas filter (14).

k. Slide T-bolt clamp (3, 5, 18, 20) over ends of air duct hose (4 and 19). Slide ends of air duct hose (4 and 19) over intake manifold inlet and bottom manifold outlet, respectively.

l. Using carrying handles, lower top manifold into place while guiding air hose (4 and 19) over top manifold inlet and outlet, respectively. Tighten T-bolt clamps.

m. Place eight turnbuckles (1) in position and tighten.

n. Install two sliding bolts (9) in swivel base.

17. Installation

a. Install and position engine and blower as described in paragraphs 31c and d.

b. Install elbow coupling (13, fig. 2) on canister air outlet.

c. Connect air inlet and outlet groups as described in TM 3-4340-207-12.

Section III. GASOLINE ENGINE GROUP

18. Power Unit

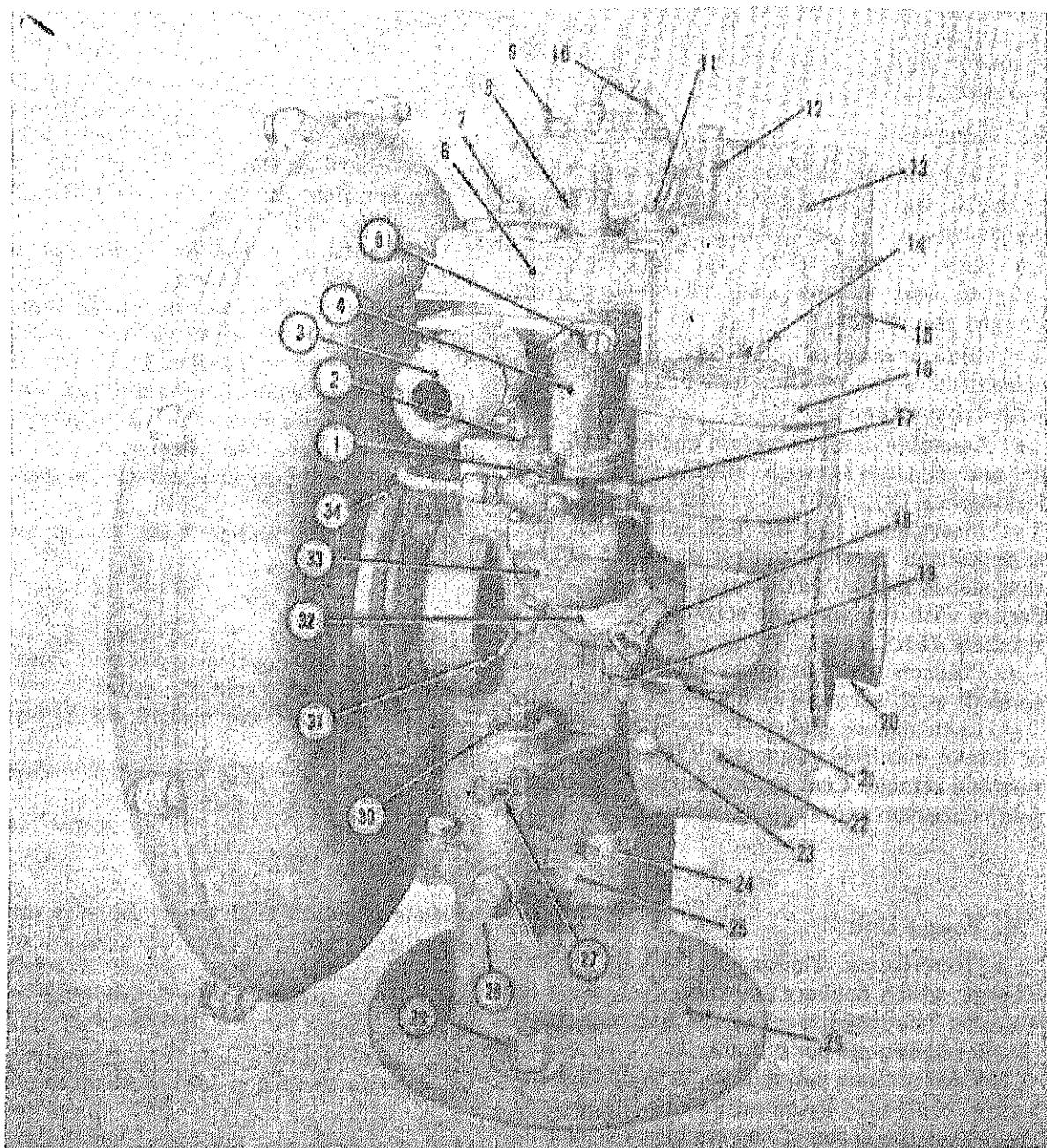
a. *Description.* The gasoline engine drives a blower which delivers 300 cubic feet of air per minute. The rated speed of the engine is 2,600-3,600 revolutions per minute; its idling speed is 1,750 revolutions per minute. A vane-type governor, controlled by an adjustable thumbscrew, regulates the speed of the engine at a standard setting (no load) of 3,300 revolutions per minute. The engine is lubricated positively by the splash system. Mountings of the engine and components are shown in figures 4 and 5.

b. *Functioning.* Fuel is fed through the fuel line (34, fig 4) to the carburetor where it is vaporized and mixed with air. The vapor-air mix-

ture is drawn through the intake valve into the cylinder where it is compressed by the piston. A high-tension current, which is conducted from the magneto to the spark plug by the ignition cable (10), ignites the fuel mixture. The power resulting from the combustion of the fuel forces the piston downward causing a circular motion of the crankshaft. Gases remaining in the cylinder are forced out the exhaust valve to the exhaust muffler as the piston rises again. The cycle repeats to give a continuous rotation of the crankshaft which rotates the blower fan.

c. *Compression Test.* Use a compression gage to check compression at the cylinder;

(1) Remove spark plug.

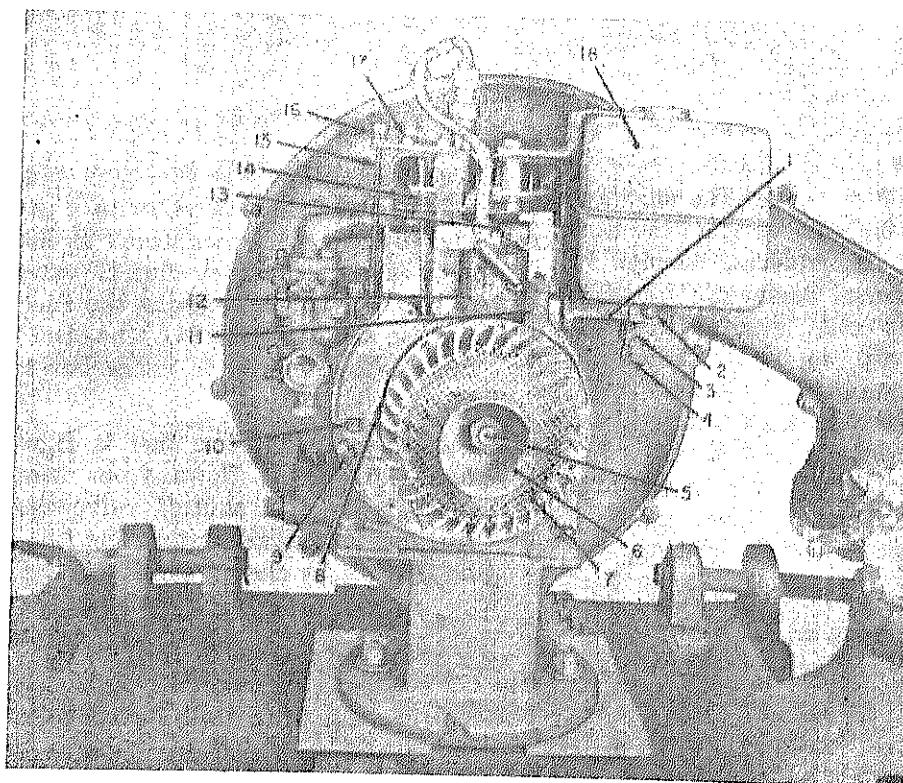


1 Throttle stop screw
2 Machine screw
3 Muffler
4 Carburetor intake elbow

5 Machine screw
6 Cylinder head
7 Cylinder head screw
8 Spark plug

Figure 4. Gasoline engine and blower.

9 Capscrew	22 Blower housing
10 Ignition cable	23 Capscrew
11 Governor adjusting screw	24 Assembled washer bolt
12 Fuel tank upper bracket	25 Engine base
13 Fuel tank	26 Engine stand
14 Wingnut	27 Oil filler plug
15 Stop switch	28 Oil drain plug
16 Air cleaner	29 Locknut
17 Idle valve	30 Cylinder mounting screw
18 Choke	31 Needle valve
19 Machine bolt	32 Air cleaner elbow
20 Starting pulley	33 Carburetor
21 Air cleaner brace	34 Fuel line

Figure 4—Continued.

1 Fuel tank lower bracket	4 Fuel shutoff valve
2 Self-tapping screw	5 Flywheel nut
3 Fuel shutoff valve assembly	6 Starter pulley

Figure 5. Engine assembly with air cleaner and blower housing removed.

- 7 Screen assembly
- 8 Magneto dust cover
- 9 Magneto plate
- 10 Machine screw
- 11 Armature mounting screw
- 12 Armature
- 13 Ignition cable nut

- 14 Governor vane
- 15 Governor control
- 16 Governor adjusting screw locknut
- 17 Cylinder head screw
- 18 Fuel tank

Figure 5—Continued.

(2) Take compression reading at cylinder while engine is cranked with starter rope. Set compression gage at zero before and after checking cylinder.

Note. Steadiness of the compression reading will indicate proper valve action. Minor fluctuations do not necessarily indicate leakage. If comparison is desired, compare pressure to that obtained in testing a new engine.

d. Removal and Disassembly.

- (1) *Removal of inlet group, outlet group, and elbow coupling.* Follow directions given in paragraphs 13a and b.
- (2) *Removal of engine.* The engine itself cannot be removed from the canister without also removing the blower.
 - (a) To remove engine and blower as a single unit, remove two locknuts (29, fig. 4), which fasten engine stand to swivel base, and lift engine-blower assembly off swivel base.
 - (b) Separate engine and blower by disassembling blower as described in paragraph 8.
 - (c) Remove four assembled washer bolts (24), which fasten base of engine to engine stand (29).
- (3) *Disassembly.* For disassembly of engine, refer to paragraphs 19 through 26 below. Engine can be disassembled without removing from canister.

e. Inspection and Maintenance. Clean all metal parts of engine with dry-cleaning solvent. Inspect engine (TM 3-4240-207-12). If engine did not pass compression test or if operation of engine indicates that disassembly of engine is required, refer to paragraphs 19 through 26 for required disassembly procedures.

f. Assembly and Installation.

- (1) Refer to paragraphs 19 through 26 for assembly of engine.

- (2) Place engine on engine stand (26, fig. 4) and secure with four assembled washer bolts (24).
- (3) Assemble and install blower as described in paragraph 10.
- (4) Place engine-blower assembly on swivel base of canister and secure with two locknuts (29).

19. Fuel Tank, Fuel Line, and Fittings

a. Description. The fuel tank (18, fig. 5) is a 3-quart metal container with a cap. The fuel line (34, fig. 4) is connected to the fuel tank by means of the fuel shutoff valve assembly (3, fig. 5), which contains the fuel filter and the fuel shutoff valve (4). The other end of the fuel line is connected to the carburetor (33, fig. 4).

b. Functioning. The fuel is filtered by the fuel filter as it flows from the fuel tank through the fuel shutoff valve assembly and fuel line to the carburetor. The fuel supply can be shut off by closing the fuel shutoff valve.

c. Removal.

- (1) Close fuel shutoff valve (4, fig. 5) and remove fuel tank drain plug (6, fig. 6) to drain fuel from tank.
- (2) Detach fuel line from carburetor and fuel shutoff valve assembly (3, fig. 5).
- (3) Remove two screws (9, fig. 4) and two screws (1, fig. 15) which fasten upper bracket (12, fig. 4) to fuel tank and cylinder head cover. Lift off bracket.
- (4) Remove screw (2, fig. 5) and lock-washer which fasten lower bracket (1) to fuel tank. Lift off fuel tank.
- (5) Unscrew fuel shutoff valve assembly (3) from fuel tank.

(2) Unscrew fuel shutoff valve (10) from fuel tank outlet. Remove valve packing (9).

e. Inspection and Maintenance.

(1) *Fuel line.* Wash fuel line thoroughly in dry-cleaning solvent and dry with compressed air. Inspect the fuel line to make sure that it is not broken, obstructed, or otherwise damaged. Replace if necessary.

(2) *Fuel shutoff valve assembly and drain plug.* Clean drain plug (6) and fuel shutoff valve assembly, consisting of fuel shutoff valve (10), valve packing nut (11), fuel tank outlet (8), and fuel line connector (7), with dry-cleaning solvent and dry thoroughly. Inspect valve for serviceability. Replace if necessary.

(3) *Fuel tank assembly.* Clean all fuel tank parts with dry-cleaning solvent. Clean inside of fuel tank with gasoline. Inspect fuel tank to be sure that it is in good condition and not bent, rusted out, or otherwise damaged. Replace if necessary.

f. Assembly of Outlet and Fuel Shutoff Valve.

(1) Place packing (9) on fuel tank outlet (8) and fasten with nut (11) and fuel shutoff valve (10).

(2) Screw fuel line connector (7) to fuel tank outlet.

g. Installation.

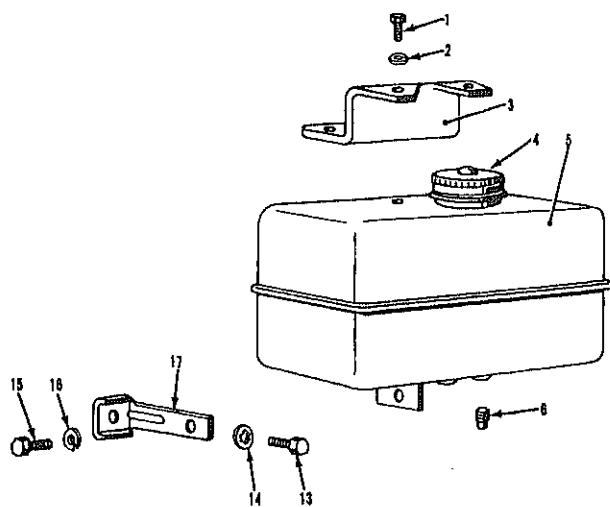
(1) Place fuel tank on lower bracket (1, fig. 5) and fasten with screw (2) and lockwasher.

(2) Position upper bracket (12, fig. 4) on cylinder head cover and fuel tank. Fasten with two screws (9) and two screws (1, fig. 15).

(3) Connect fuel line to carburetor and fuel tank shutoff valve assembly (3, fig. 5).

(4) Screw shutoff valve assembly into fuel tank and insert fuel tank drain plug.

(5) Fill fuel tank and open fuel tank shutoff valve (4) to make sure that fuel flows from tank.



1 Capscrew
2 Lockwasher
3 Upper bracket
4 Cap
5 Fuel tank
6 Drain plug
7 Fuel line connector
8 Fuel tank outlet
9 Valve packing
10 Fuel shutoff valve
11 Valve packing nut
12 Fuel line
13 Capscrew
14 Lockwasher
15 Self-tapping screw
16 Lockwasher
17 Lower bracket

Figure 6. Fuel tank assembly, exploded view.

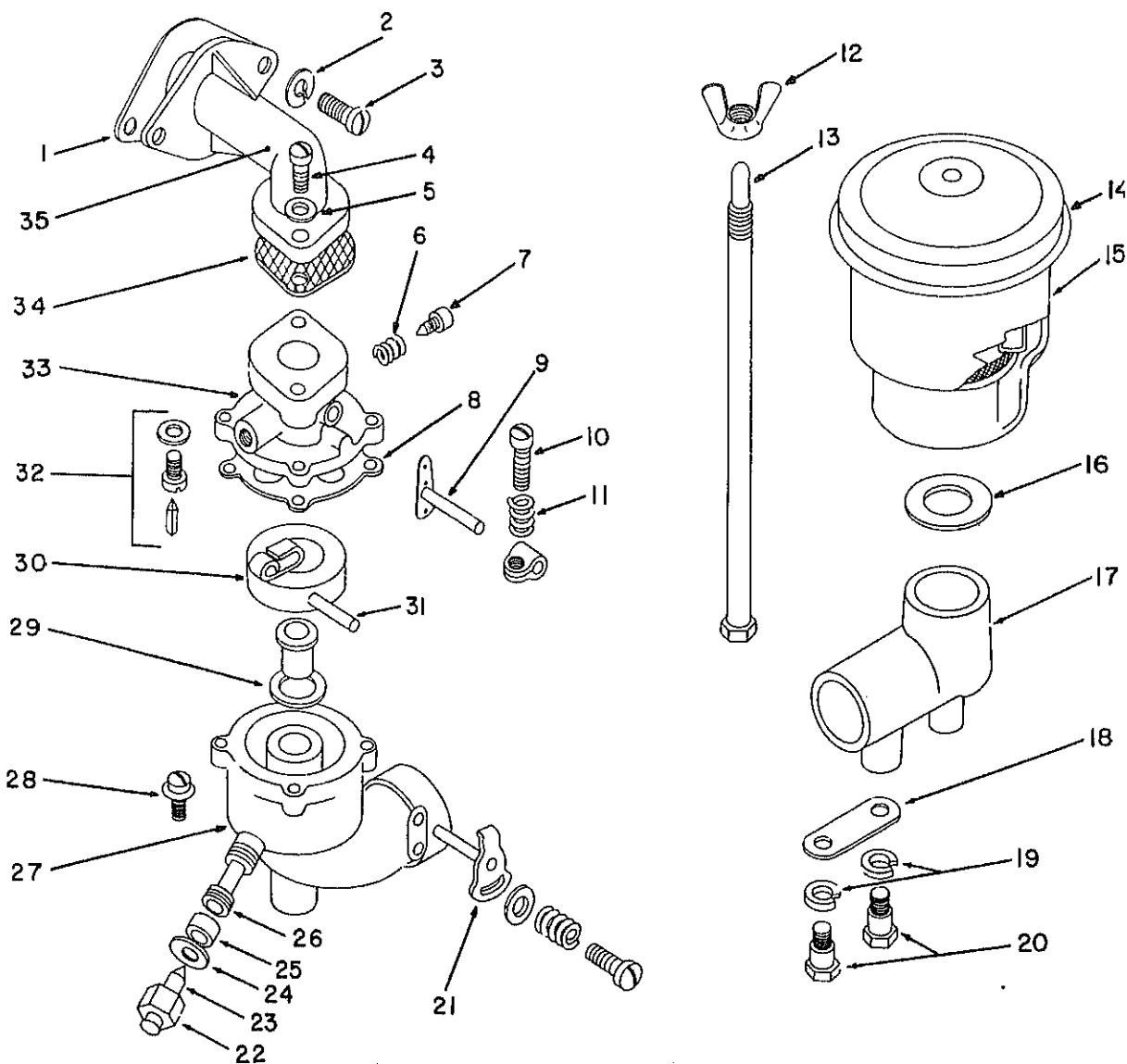
d. Disassembly of Outlet and Shutoff Valve.

(1) After removing fuel shutoff valve assembly from fuel tank, unscrew fuel line connector (7, fig. 6) from fuel outlet (8).

20. Air Cleaner and Air Cleaner Elbow

a. Description and Functioning. The air cleaner, which consists of the bowl (15, fig. 7) and cover and filter element (14), is secured to the elbow (17) by air cleaner bolt (13) and wingnut (12). The elbow is held to the carburetor by means of brace (18) and two machine bolts (20).

Air enters the cleaner at the cover and passes through the oil reservoir and filter element where dirt and dust particles are removed. Air flows to the carburetor through the elbow.



1 Intake elbow gasket
2 Lockwasher

3 Machine screw
4 Machine screw

Figure 7. Carburetor and air cleaner, exploded view.

5 Lockwasher	21 Choke
6 Idle valve spring	22 Packing nut
7 Idle valve screw	23 Needle
8 Body gasket	24 Packing washer
9 Throttle shaft	25 Packing
10 Idle speed adjustment screw	26 Nozzle
11 Idle speed adjustment spring	27 Lower body
12 Wingnut	28 Machine screw
13 Air cleaner bolt	29 Venturi gasket
14 Cover and filter element	30 Float
15 Bowl	31 Float hinge pin
16 Gasket	32 Valve and seat
17 Elbow	33 Upper body
18 Brace	34 Mounting gasket
19 Lockwashers	35 Intake elbow
20 Machine bolts	

Figure 7—Continued.

b. Removal and Disassembly.

- (1) Remove two machine bolts (19, fig. 4), which fasten brace (21) to air cleaner elbow (32) and air cleaner.
- (2) Slide air cleaner elbow from carburetor.
- (3) Remove wingnut (12, fig. 7) and withdraw air cleaner bolt (13), which extends through entire assembly.
- (4) Lift cover and filler element (14) from bowl (15).

c. Inspection and Maintenance.

- (1) Clean air cleaner as described in TM 3-4240-207-12.
- (2) Clean elbow, brace, and bolts with dry-cleaning solvent and dry with compressed air.
- (3) Inspect air cleaner for broken or damaged gasket. Check also for cracks, bends, dents, or other signs of damage. Replace air cleaner assembly if damaged.
- (4) Inspect air cleaner elbow and brace. Replace if required.

d. Assembly and Installation.

- (1) Connect elbow (17) to carburetor with brace (18), two machine bolts (20), and lockwashers (19).
- (2) Place bowl (15) on elbow (17) and fill with oil (TM 3-4240-207-12).
- (3) Place filter element and cover (14) in position and secure by sliding air cleaner bolt (13) through elbow and air cleaner. Tighten wingnut (12).

21. Carburetor

a. Description. The carburetor, which consists of an upper body (33, fig 8) and a lower body (27), is mounted to the intake elbow (35). The choke (21) and needle valve, which consists of packing nut (22), needle (23), packing washer (24), packing (25), and nozzle (26), are located on the lower body. Float (30) pivots about hinge pin (31) inside the lower body pushing the valve into the valve seat (32). Throttle shaft (9), idle valve screw (7), and idle valve spring (6) are located on the upper body. Idle speed adjustment screw (10) and idle speed adjustment spring (11) are attached to the throttle shaft. Body gasket (8) and venturi gasket (29) are used between the upper and lower bodies. Mounting gasket (34) is used between upper body and carburetor intake elbow, and intake elbow gasket (1) is used between the intake elbow and cylinder block.

b. Functioning. Fuel from the fuel line flows through the upper body into the lower body reservoir until the fuel level is sufficient to cause the float (30) to pivot about float hinge pin (31) and force the valve into the valve seat (32). Throttle shaft (9) rotates a butterfly valve which, in turn, regulates the flow of air through the carburetor. The air flowing past the nozzle draws fuel from the reservoir into the airstream where the fuel vaporizes and mixes with the air. The fuel-air mixture then passes through the carburetor intake elbow to

the engine. Needle (23) of the needle valve assembly regulates the flow of fuel into the air stream during normal operation. Idle valve screw (7) regulates the flow of fuel into the airstream at idle speed. Idle speed adjustment screw (10) sets the throttle butterfly for minimum operating speed without stalling. Choke (21) is a butterfly valve which is hand operated by a lever that regulates the flow of air from the air cleaner. The choke increases richness of the fuel-air mixture while the engine is cold to a level suitable for starting the engine. The choke is opened by hand after the engine is warm.

c. Removal

- (1) Remove air cleaner and air cleaner elbow (par. 20b).
- (2) Disconnect fuel line from carburetor.
- (3) Disconnect governor spring (3, fig. 8) and throttle link (4) from throttle lever (2) on carburetor throttle shaft.
- (4) Remove two machine screws (4, fig. 7) and lockwashers (5), which fasten carburetor to carburetor intake elbow (35). During this operation, hold carburetor so it will not fall. (Carburetor intake elbow can be removed from engine by removing two machine screws (3) which fasten it to cylinder block.)
- (5) Remove carburetor mounting gasket (34).

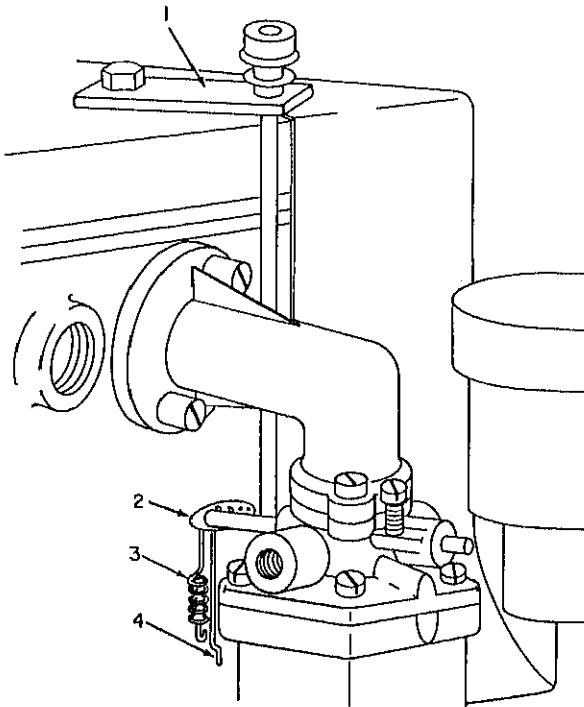
d. Disassembly.

- (1) Remove four machine screws (28, fig. 7) and lockwashers which fasten upper body of carburetor (38) to lower body (27). Separate halves of body.
- (2) Turn upper body upside down and remove float (30) by detaching float hinge pin (31) from float bracket inside upper body. Remove carburetor body gasket (8).
- (3) With carburetor in same position, lift out valve and seat (32).
- (4) Remove carburetor idle valve screw (7), idle valve spring (6), idle spring adjustment screw (10), and idle speed adjustment spring (11) from upper body.
- (5) Remove carburetor venturi gasket (29).

- (6) Unscrew needle (23) and packing nut (22) from carburetor nozzle (26). Remove needle packing washer (24) and packing (25) from packing nut. Unscrew carburetor nozzle (26) from lower body.

e. Inspection and Maintenance.

- (1) Clean all metal parts of carburetor with dry-cleaning solvent and dry carefully with compressed air. Blow out all channels, vents, and drilled passages with compressed air. Make sure that no varnish-like residue remains in the carburetor fuel bowl.
- (2) Inspect all parts for cracks, scoring, pitting, ridges, and excessive wear. If worn or damaged, replace using parts from carburetor overhaul kit as indicated in TM 3-4240-207-35P.



1 Governor control bracket

2 Throttle lever

3 Governor spring

4 Throttle link

Figure 8. Governor-carburetor linkage and governor control bracket.

- (3) Inspect idle speed adjustment spring (11) for cracked or broken coils and rust or corrosion. If defective, replace with spring from carburetor overhaul kit.
- (4) Inspect needle (23) and nozzle (26) for good condition. If defective, replace with parts from carburetor overhaul kit.
- (5) Inspect the mating surfaces of the carburetor air intake elbow and the air cleaner elbow (17) to make sure that they are clean and free of nicks or scoring which may prevent a tight fit.
- (6) Inspect all threads for stripping, crossing, and burring; replace any component if threads which cannot be made serviceable by recutting.
- (7) Attach float (30) to float bracket in upper body and insert float hinge pin (31). Make sure that float moves easily and that bracket is not bent so that it cannot control fuel inlet valve adequately. Adjust if possible; replace float or upper body if adjustment is not possible.
- (8) Replace all gaskets and fiber washers when overhauling carburetor.

f. Assembly.

- (1) Fasten nozzle (26) to lower body of carburetor (27). Make sure that it is tight.
- (2) Insert needle (23) through packing nut (22). Insert packing washer (24) and packing (25) in packing nut. Screw needle into nozzle. Tighten nut to lower body of carburetor.
- (3) Fasten idle valve screw (7), idle valve spring (6), idle speed adjustment screw (10), and idle speed adjustment spring (11) to upper body of carburetor (33).
- (4) Insert fuel inlet valve and seat (32) into upper body.
- (5) Replace body gasket (8) and position float (30) on float bracket in upper body. Insert float hinge pin (31) through float and float bracket.
- (6) Replace venturi gasket (29) position upper and lower bodies of carburetor

correctly. Fasten bodies together with four machine screws (28) and lockwashers.

g. Installation.

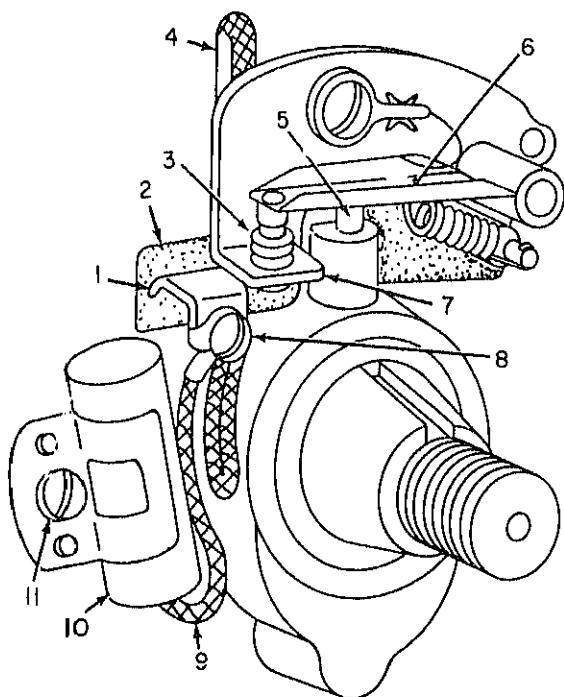
- (1) Replace mounting gasket (34).
- (2) If carburetor intake elbow (35) has been removed from engine, fasten it to cylinder block with two machine screws (3). Fasten carburetor and carburetor mounting gasket to carburetor intake elbow with two machine screws (4) and lockwashers (5).
- (3) Connect fuel line to upper body of carburetor.
- (4) Adjust carburetor for most efficient operation as described in TM 3-4240-207-12.

22. Magneto Breaker Points and Capacitor

a. Description and Functioning. The magneto breaker points consist of a bracket (7, fig. 9) with a permanent contact and a breaker arm (6) that breaks the magneto circuit when the contact point plunger (5) rises. The breaker point bracket is insulated from the magneto plate (5, fig. 10) and is held in place by adjusting lock screw (1). The capacitor (10, fig. 9), which is mounted to the magneto plate by screw (11), prevents the breaker points from pitting and assists in developing the high tension current generated by the magneto.

b. Removal.

- (1) Remove four capscrews (23, fig. 4), which secure engine blower housing (22). Remove blower housing.
- (2) Remove flywheel (par. 26b).
- (3) Remove two screws and lockwashers which fasten magneto dust cover (8, fig. 5) to magneto plate (9). Remove dust cover.
- (4) Remove clip (1, fig. 9) and screw (8), which fasten the capacitor and armature wires (9 and 4) to the magneto point bracket (7). Loosen adjusting lock screw (1, fig. 10) and remove breaker point assembly. Remove cambric insulator (2, fig. 11)
- (5) Remove capacitor mounting screw (11, fig. 9) and lift out capacitor.



1 Clip
2 Insulator
3 Permanent contact point
4 Armature wire
5 Contact point plunger
6 Breaker arm
7 Magneto point bracket
8 Screw
9 Capacitor wire
10 Capacitor
11 Capacitor mounting screw

Figure 9. Capacitor and breaker assembly.

c. Inspection and Maintenance.

- (1) Inspect magneto point bracket for pitted or burned points. Clean points (par. 22f (4) below). If points are burned or pitted or if proper gap cannot be obtained, replace breaker point assembly.
- (2) If difficulty in starting the engine is encountered, replace capacitor. Always replace capacitor when points are replaced.

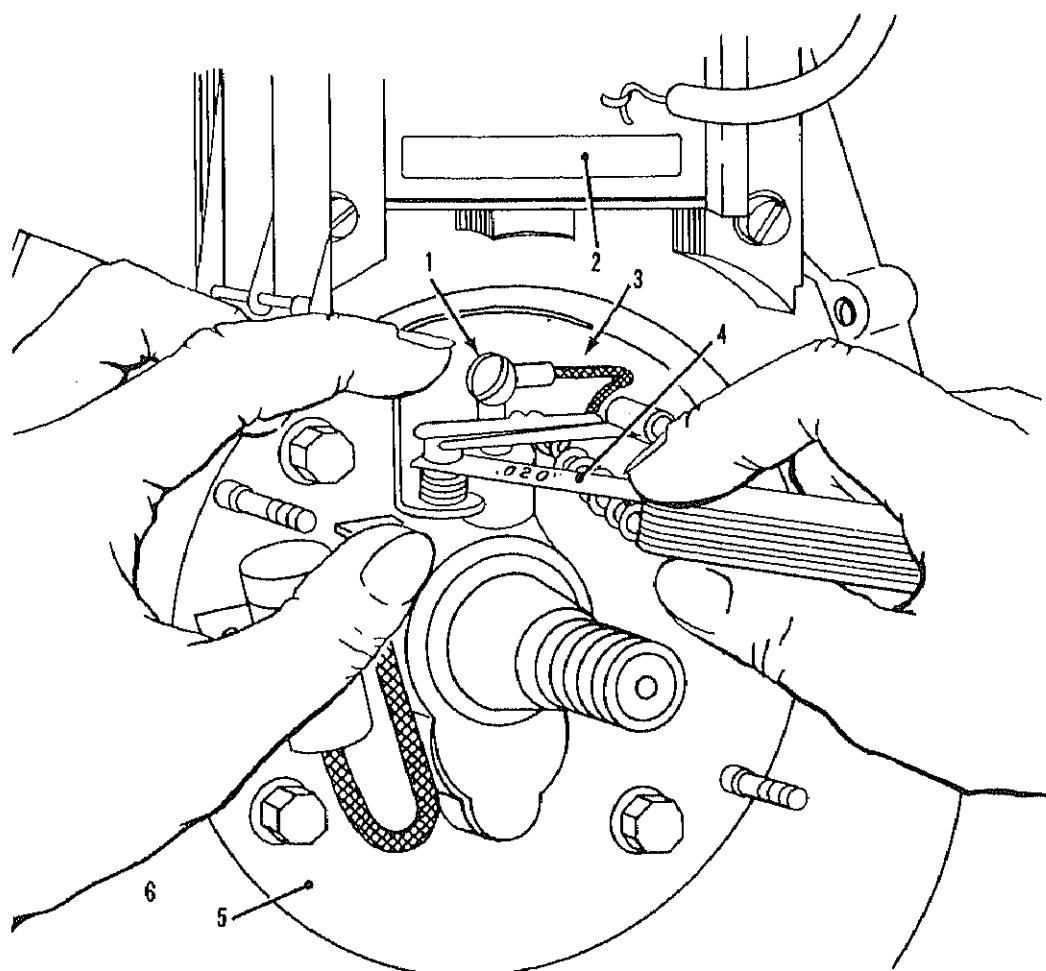
d. Ignition Repair Kit. The ignition repair kit consists of a breaker point assembly and a capacitor.

e. Installation.

- (1) Install capacitor and secure with mounting screw (11, fig. 9).
- (2) Install the cambric insulator (2, fig. 11) and contact point bracket (3). Be sure that the small boss (1) on the magneto plate protrudes through the small hole in the insulator and enters the hole in the point bracket.
- (3) Tighten adjusting lock螺丝. Fasten armature and capacitor wires with clip and screw. Be sure that the clip does not touch the capacitor or that the ends of the wires do not touch the breaker, because these conditions cause a short circuit.
- (4) Adjust magneto breaker points (par. 22f (4) below).
- (5) Position magneto dust cover on magneto plate and fasten with two screws and lockwashers.
- (6) Install flywheel (par. 26f (8)).
- (7) Install blower housing (22, fig. 4) and secure with four capscrews (23).

f. Adjustment.

- (1) Remove blower housing (b above).
- (2) Remove flywheel (par. 26b).
- (3) Remove magneto dust cover (b above).
- (4) Turn crankshaft until points open to widest gap. Loosen adjusting lock螺丝 (1, fig. 10) and move contact point bracket (3) up or down to obtain a 0.020-inch gap as measured with feeler gage (4). Points must be clean and must line up squarely to make good contact. Use fine sandpaper or file to dress the points. Tighten adjusting lock螺丝. Turn crankshaft so that contact points are closed. Twelve- to sixteen-ounce tension should open the points. If spring tension is too weak, bend contact spring tang to get proper tension. If a gap of 0.020 inch cannot be obtained, the breaker points must be replaced (par. 22c (1)).
- (5) Position magneto dust cover on magneto plate and fasten with two screws and lockwashers.
- (6) Install flywheel (par. 26f (8)).
- (7) Install blower housing (l above).



1 Adjusting lockscrew
 2 Armature coil
 3 Contact point bracket

4 Feeler gage
 5 Magneto plate
 6 Screw

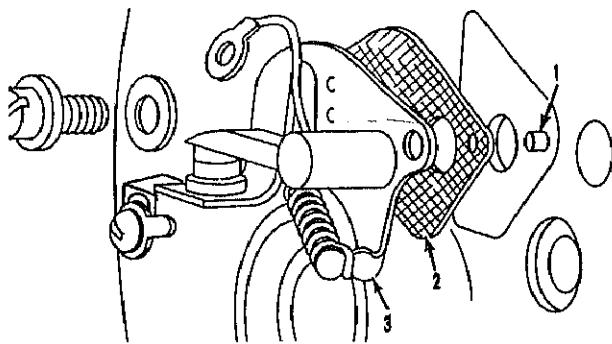
Figure 10. Adjusting magneto breaker points.

23. Governor and Magneto

a. Description.

(1) **Governor.** The governor consists of a governor vane (10, fig. 12), throttle

link (14), speed adjuster (2), governor spring (1), and governor control (15, fig. 5). The governor vane is supported by a bracket that permits



1 Boss on magneto plate

2 Insulator

3 Contact point bracket

Figure 11. Breaker point assembly, exploded view.

the vane to pivot freely. The bracket is mounted to the armature by screw (11, fig. 12). The vane is connected by means of an arm and the throttle link to the throttle lever, (2, fig. 14). Speed adjuster (2, fig. 12) moves up and down by turning governor adjusting screw locknut (16, fig. 5).

(2) *Magneto.* The magneto consists of an armature (4, fig. 12), breaker point assembly (9), capacitor (18), ignition cable (5), and flywheel (3, fig. 18). One end of the ignition cable is soldered to the armature (4, fig. 12), and the other end contains a fitting that is connected to the spark plug. The cable shield is grounded by armature mounting screw (7). Description and functioning of the breaker points and capacitor are given in paragraph 22.

b. Functioning.

(1) *Governor.* Air forced by the flywheel (3, fig 18) deflects the governor vane (10, fig 12). A force created by deflection of the vane is transmitted through the throttle link (3, fig 14) to the throttle lever (2) and attempts to

slow the engine down. Spring (1) counteracts this force to maintain a constant engine speed. The engine speed varies directly with the tension of the spring. The spring tension is varied by turning governor adjusting screw locknut (16, fig. 5).

(2) *Magneto.* With each revolution of the flywheel, two permanent magnets mounted in the flywheel induce a voltage in the primary winding of the armature (2, fig. 13). With the aid of the breaker points and capacitor, a high-tension current is generated in the secondary of the armature that is delivered to the spark plug by the ignition cable.

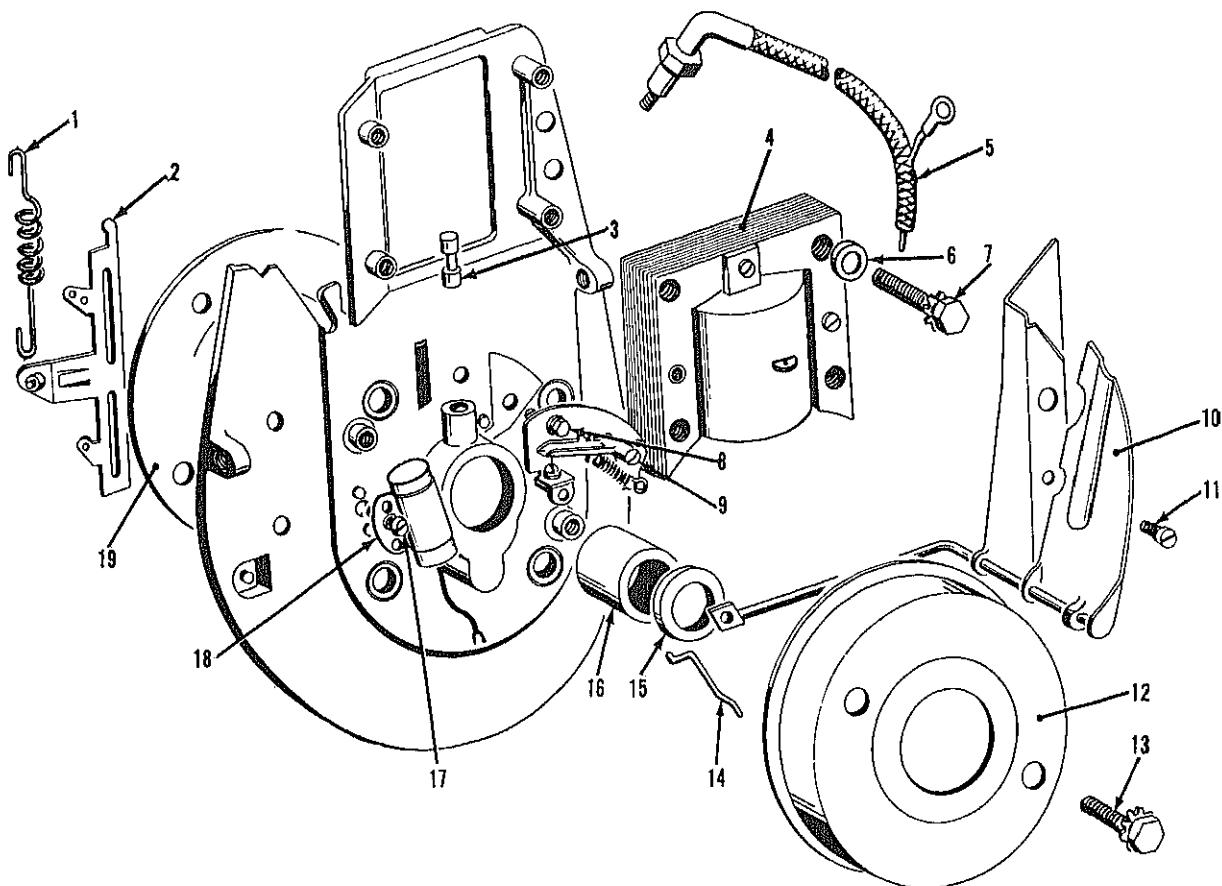
c. Removal.

(1) *Governor.*

- Remove blower housing (par. 22b (1)).
- Disconnect governor spring (3, fig. 8) and throttle link (4) from throttle lever (2) on carburetor throttle shaft.
- Remove governor adjusting screw locknut (16, fig. 5), thereby releasing governor control (15).
- Remove cylinder head screw (17), which secures bracket (1, fig. 8) for governor control (15, fig. 5). Remove governor control.
- Remove screw (11, fig 12), which secures governor vane. Remove governor vane.

(2) *Magneto.*

- Remove flywheel (par. 26b(7)) and magneto dust cover (par. 22b(3)).
- Remove magneto breaker points (par. 22b(4)).
- Remove capacitor (par. 22b(5)).
- Disconnect the ignition cable by unscrewing the ignition cable nut (18, fig. 5) at magneto end. Remove armature lead wires.
- Remove four screws (11), flat washers, and lockwashers which fasten armature (12) to the magneto plate, and pry armature loose from plate with a screwdriver.



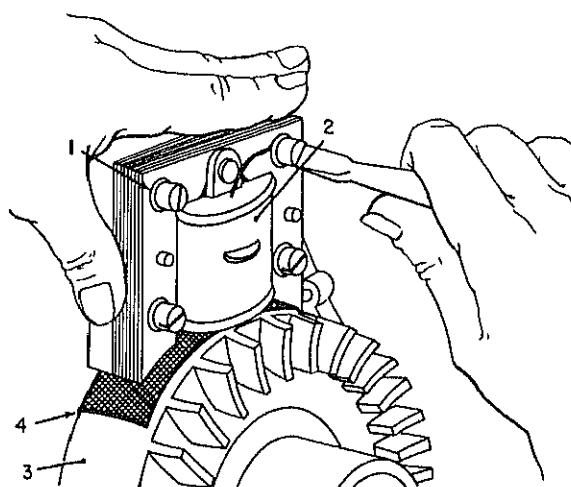
1 Governor spring	11 Screw
2 Speed adjuster	12 Magneto dust cover
3 Contact point plunger	13 Dust cover mounting screw
4 Armature	14 Throttle link
5 Ignition cable	15 Oil seal
6 Armature mounting washer	16 Magneto bushing
7 Armature mounting screw	17 Capacitor mounting screw
8 Breaker point assembly	18 Capacitor
9 Breaker point assembly	19 Magneto plate gasket set
10 Governor vane	

Figure 12. Governor and magneto, exploded view.

d. Inspection and Maintenance.

- (1) Inspect all connections for loose or frayed wires. Tighten or replace.
- (2) Wipe all parts with a dry cloth.
- (3) Inspect breaker points (par. 22c(1)).
- (4) Inspect stop switch spring in blower housing. Dirt under spring will cause a short circuit. Check and clean.

- (5) Connect ohmmeter to lead and case of capacitor. The reading should be infinity. If the reading is zero, replace capacitor.
- (6) Inspect armature for condition. If signs of damage such as voltage breakdown are visible, replace armature.



1 Armature mounting screw
2 Armature
3 Flywheel
4 Shim

Figure 13. Adjusting armature airgap.

(7) Inspect governor spring and throttle link for cracks, breaks, corrosion, and other signs of wear. Check governor vane and governor control for bends. Make no adjustments. If any defects are found, replace parts.

e. Installation.

(1) Magneto.

- (a) Position armature on two locating pins on magneto plate and fasten loosely with four screws (11, fig. 5), flat washers, and lockwashers.
- (b) Attach armature lead wires and connect ignition cable by tightening nut (13).
- (c) Turn flywheel until magnets are directly below the armature laminations.
- (d) Raise armature and insert a strip of 0.008-inch brass shim stock (4, fig. 13) or instruction tag supplied with new armatures between the end of the armature laminations and the flywheel magnets. Airgap should be from 0.002 to 0.012 inch.

(e) Press armature down and tighten the four armature mounting screws (1).

(f) Pull shim out.

(g) Install capacitor (par. 22e).

(h) Install breaker points (par. 22e).

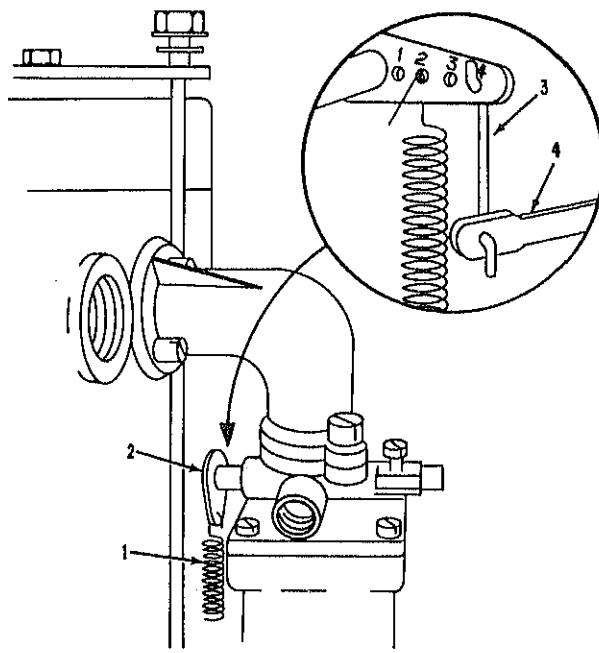
(i) Install magneto dust cover (par. 22e).

(j) Install flywheel (par. 26f).

Note. The magneto is always correctly timed when the flywheel is properly installed. Do not attempt to change timing by relocating any parts or filing crankshaft flat.

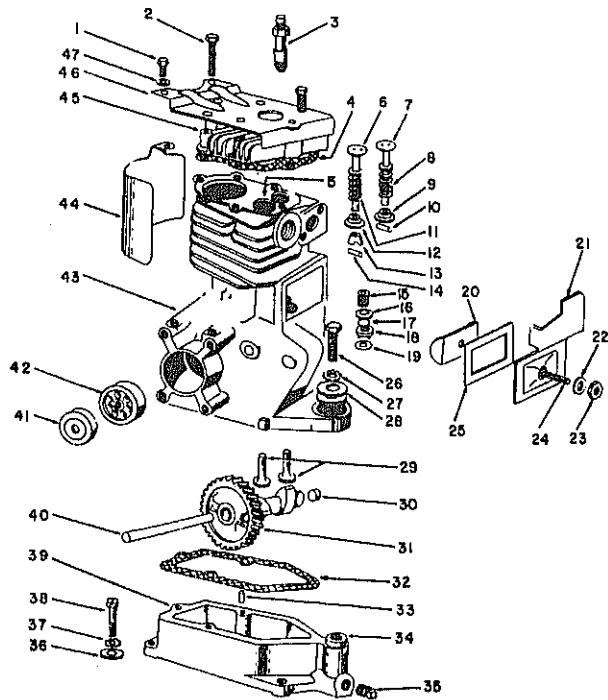
(2) Governor.

- (a) Secure governor vane (10, fig. 12) with screw (11).
- (b) Insert governor control (15, fig. 5) into governor control bracket (1, fig. 8). Connect end of governo-



1 Governor spring
2 Throttle lever
3 Throttle link
4 Governor vane arm

Figure 14. Installation of governor.



- 1 Fuel tank mounting screw
- 2 Cylinder head mounting screw
- 3 Spark plug
- 4 Cylinder head gasket
- 5 Exhaust valve seat
- 6 Exhaust valve
- 7 Intake valve
- 8 Compression spring
- 9 Valve spring retainer
- 10 Pin
- 11 Compression spring
- 12 Valve spring retainer
- 13 Exhaust valve rotocap
- 14 Pin
- 15 Breather retainer spring
- 16 Breather cover
- 17 Breather disk
- 18 Breather body
- 19 Breather body gasket
- 20 Oil spray shield
- 21 Valve cover
- 22 Valve cover washer
- 23 Valve cover nut
- 24 Valve cover stud
- 25 Valve cover gasket
- 26 Cylinder block mounting screw
- 27 Lockwasher
- 28 Cylinder mounting washers
- 29 Valve tappets

Figure 15. Engine assembly, exploded view.

- 30 Camshaft plug
- 31 Cams and cam gear
- 32 Engine base gasket
- 33 Engine base pin
- 34 Filler plug
- 35 Drain plug
- 36 Cylinder mounting washer
- 37 Lockwasher
- 38 Cylinder mounting screw
- 39 Engine base
- 40 Camshaft
- 41 Oil seal
- 42 Sealing bearing
- 43 Cylinder block
- 44 Cylinder shield
- 45 Cylinder head
- 46 Cylinder head cover
- 47 Lockwasher

Figure 15—Continued.

control to speed adjuster (2, fig. 12). Screw governor control screw locknut (16, fig. 5) onto governor control. Mount governor control bracket to cylinder head with cylinder head screw (17).

(c) Connect spring (3, fig. 8) to speed adjuster and to number 2 hole of throttle lever (2). Connect throttle link (4) to governor vane arm and to number 4 hole of throttle lever (2).

(d) Install blower housing (par. 22e (7)).

f. Adjustment. Start engine and adjust governor adjusting screw locknut (16, fig. 5) until engine is running at approximately half speed. For more accurate setting, use a manometer (TM 3-4240-207-12).

Note. Top loop of throttle spring should be hooked in number 2 hole of throttle lever. Should closer governing be required, move spring hook to number 1 hole. If throttle oscillates move spring to number 3 hole.

24. Cylinder Head

a. Description and Functioning. The cylinder head (45, fig. 15) is a metal casting with air vanes crossing the top. A metal cover (46) about the cylinder head contains a hole through which the spark plug base mates with a threaded hole in the cylinder head. The cylinder head forms the upper part of the chamber in

which the fuel-air mixture is compressed and ignited. The air vanes on top of the cylinder head together with the cover, form channels through which air is forced from the flywheel to cool the engine.

b. Removal.

- (1) Disconnect ignition cable and remove spark plug (TM 3-4240-207-12).
- (2) Remove engine blower housing (par. 22b(1)).
- (3) Remove six cylinder head screws (2, fig. 15), which fasten cylinder shield (44) and governor control bracket (1, fig. 8) to cylinder head.
- (4) Remove upper fuel tank bracket (par. 19c(3)).
- (5) Remove cylinder head cover (46, fig. 15) and lift off cylinder head (45). Remove cylinder head gasket (4).

c. Inspection and Maintenance.

- (1) Turn engine over with starter pulley until piston is at top dead center. Remove any accumulation of carbon in cylinder head and on top of cylinder block with a stiff wire brush.
- (2) Clean head of piston and valves and around piston and valve exhaust ports until all carbon deposits are removed. Take special care not to break edges of exhaust ports. Clean all parts with dry-cleaning solvent and dry with compressed air if available.

Caution: Be careful not to damage cylinder wall or valve seats.

- (3) Inspect cylinder head for cracks, chips, scoring, or any signs of wear or damage. Be sure the threads of cylinder head which mate with the spark plug are not crossed or otherwise damaged. If cylinder head is defective, replace.
- (4) Replace cylinder head gasket.

d. Installation.

- (1) Position cylinder head gasket (4, fig. 15), cylinder head (45), and cylinder head cover (46).
- (2) Position governor control bracket (1, fig. 8) and fasten with one of six cylinder head screws (2, fig. 15).
- (3) Install upper fuel tank bracket (par. 19g(2)).

- (4) Position cylinder shield (44) and fasten with cylinder head screw (2). Install remaining cylinder head screws and tighten observing proper wrench torque (par. 4c).
- (5) Install spark plug and ignition cable (TM 3-4240-207-12).
- (6) Install blower housing (par. 22e(7)).

25. Valves

a. Description. The engine contains an intake valve (7, fig. 15) and an exhaust valve (6), each consisting of a beveled valve head and a valve stem. The valves are held tightly in their seats by compression springs (8 and 11) until forced up by their respective valve tappets (29). The breather assembly, which consists of the retainer spring (15), cover (16), disk (17), body (18), and body gasket (19), is located inside the cylinder block behind the valve cover (21).

b. Removal.

- (1) Remove air cleaner (par. 20b).
- (2) Remove carburetor (par. 21c).
- (3) Remove cylinder head (par. 24b).
- (4) Remove nut (23, fig. 15) and valve cover washer (22) from valve cover stud (24). Lift off valve cover (21), valve cover gasket (25), and oil spray shield (20) from valve cover stud.
- (5) Use a conventional valve spring compressing tool and remove valve spring retainer pins (10 and 14) from both intake and exhaust valves (7 and 6).
- (6) Release valve spring compressing tool and remove valve spring retainer (9) and intake valve spring (8) from intake valve (7). Similarly, remove rotocap (13), valve spring retainer (12), and exhaust valve spring (11) from exhaust valve (6).
- (7) Lift valves out through valve ports in top of cylinder.
- (8) Remove breather assembly from cylinder block if necessary.

c. Inspection.

- (1) Wash all valve parts in dry-cleaning solvent.
- (2) Clean hard carbon deposits from valve heads, stems, and ports with a

stiff wire brush. Be careful not to bend or scratch valve heads or stems.

- (3) Inspect valve heads and stems for bending or warping. Check to see whether valve faces are pitted or are poorly seated. See whether valve seats are burned. If burn is not serious, reseat valves; otherwise, replace. If valve seats are badly burned, report to depot maintenance personnel; otherwise, reseat valves. If valves are deeply pitted or warped or if any other parts are cracked or worn, replace with parts from intake and exhaust valve overhaul kits.
- (4) Inspect breather assembly for good condition. Replace any defective parts.

d. Maintenance.

- (1) To check valve seats, coat the valve face with a thin film of prussian blue and rotate the valve in valve seat. Remove the valve and examine the contact pattern. The entire circumference of the valve seat should indicate contact with the valve.
- (2) If seating is faulty, grind the valve seats to an angle of 45° with a valve seat grinding tools; they are too hard to be ground easily by hand. Care should be exercised to prevent removal of too much material. Minor imperfections in the valve face seat can be corrected by lapping-in the valve.

Caution. Never turn valve one complete revolution while lapping; the abrasive compound may create grooves in the valve seats.

e. Installation.

- (1) Install breather assembly into cylinder block at valve opening.
- (2) Inspect intake and exhaust valves (7 and 6) through valve ports in top of cylinder.
- (3) Place exhaust valve spring (11), valve spring retainer (12), and exhaust valve rotocap (13) on exhaust valve. Use a conventional valve spring compress tool and insert valve spring retainer (14) into valve stem.

- (4) Place intake valve spring (8) and valve spring retainer (9) on intake valve. Use a conventional valve spring compressing tool and insert valve spring retainer pin (10) into valve stem.
- (5) In the following order, place the oil spray shield (20), a new valve cover (21) on the valve cover stud (24). Fasten valve cover washer (22) and nut (23) tightly.
- (6) Install cylinder head (par. 24d).
- (7) Install carburetor (par. 21g).
- (8) Install air cleaner (par. 20d).

f. Adjustment.

- (1) Check tappet clearance. Turn flywheel until valve opens to highest point. Then turn flywheel one complete revolution, thereby turning cam gear a half revolution. This will place lobes in position 180° from cam followers. Replace for each valve. Intake valve clearance (cold) should be 0.008 inch; exhaust valve clearance (cold) should be 0.015 inch.

Note. Always check valve clearance when engine is cold.

- (2) To adjust clearance, grind required amount from the end of the valve stem. Be sure that the cam gear is in proper position as explained in (1) above. Grind end of stem at right angles.

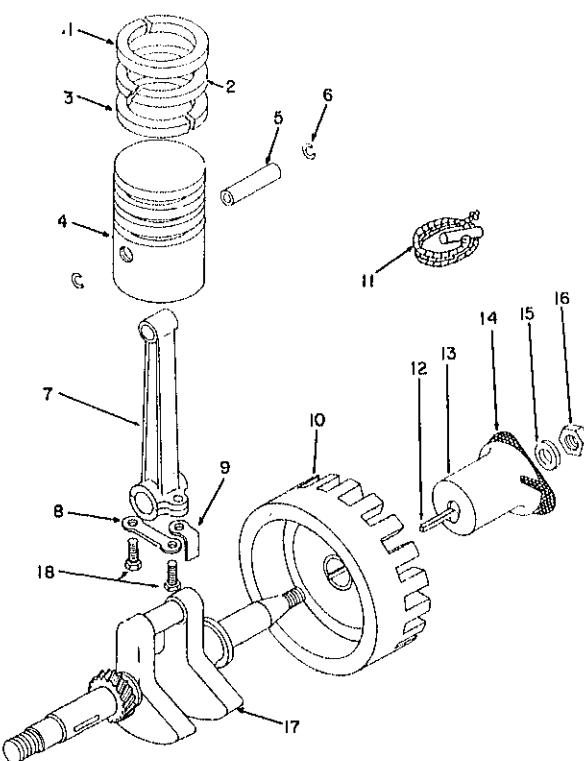
26. Piston, Connecting Rod, Flywheel, Camshaft, and Crankshaft

- a. **Description.** The piston (4, fig. 16) is connected to the crankshaft (17) by means of the connecting rod (7). Piston pin (5) fastens one end of the connecting rod to the piston. The other end of the connecting rod together with the oil dipper (9) is clamped to the crankshaft. Flywheel (10) and pulley (13) are held onto the crankshaft by washer (15) and nut (16). The cams and gear rotate around the camshaft (40, fig. 15). Each end of the camshaft fits into a hole in the engine block. The crankshaft is held in place at one end by a sealed ball bearing (42) and at the other end by the magneto bushing (16, fig. 12), which is housed by the magneto plate (5, fig. 10).

b. Removal.

- (1) Remove blower (par. 7).
- (2) Remove air cleaner (par. 20b).
- (3) Remove carburetor (par. 21c).
- (4) Remove cylinder head (par. 24b).
- (5) Remove engine from base.
 - (a) Remove oil drain plug (35, fig. 15) and drain oil from crankcase.
 - (b) Remove two cylinder mounting screws (26 and 38), two lockwashers (27 and 37), and three cylinder mounting washer (28 and 36), which fasten cylinder to base.
 - (c) Lift cylinder off engine base pins (33).
 - (d) Remove engine base gasket (32).
- (6) Remove piston and connecting rod.
 - (a) Turn engine on side.
 - (b) Remove two connecting rod screws (18, fig. 16), connecting rod lock (8), and connecting rod dipper (9), which fasten connecting rod (7) to crankshaft (17).
 - (c) Push piston and connecting rod assembly out top of cylinder.
- (7) Remove flywheel.
 - (a) Remove blower housing (par. 22b(1)).
 - (b) Place a block of wood under flywheel fin close to flywheel to hold it solid. With a large wrench, 10 inches or longer, remove flywheel nut (16) by turning it clockwise. Then remove washer, pulley (18), and screen assembly (14).
 - (c) Loosen flywheel by screwing the nut back on crankshaft until it is flush with the end of the shaft and striking it with a brass hammer or by holding a wood block against end of crankshaft and striking it with a hammer. Pull flywheel off shaft and remove key (12). Save the key.
- (8) Remove magneto dust cover and breaker point assembly (par. 22b(3)). Remove contact point plunger (5, fig. 9).

- (9) Using a file or some sharp object, place a scratch on mating teeth of cam gear and crankshaft gear so that gears can be properly meshed after assembly.



- 1 Compression ring
- 2 Compression ring
- 3 Oil ring
- 4 Piston
- 5 Piston pin
- 6 Piston pin lock
- 7 Connecting rod
- 8 Connecting rod lock
- 9 Connecting rod dipper
- 10 Flywheel
- 11 Starter rope
- 12 Flywheel key
- 13 Rope starter pulley
- 14 Screen assembly
- 15 Flywheel washer
- 16 Flywheel nut
- 17 Crankshaft
- 18 Connecting rod screw

Figure 16. Piston, connecting rod, crankshaft, and flywheel exploded view.

- (10) Remove four screws (6, fig. 10) and lockwashers which fasten the magneto plate (5) to the crankcase. Remove the magneto plate.
- (11) Remove magneto bushing (16, fig. 12) and oil seal (15) from magneto plate.
- (12) Drive out camshaft (2, fig. 17) by using a long thin punch. Do not burr or rivet end of shaft. Hold cam gear while withdrawing punch so gear does not fall and nick. Always drive camshaft out from drive side toward magneto side as shown in figure 17. Push cam gear forward into recess at front of crankcase. Remove valve tappets.
- (13) Remove capscrews inside the crankcase holding the bearing (42, fig. 15) and oil seal (41) in place. These must be removed before crankshaft can be withdrawn.
- (14) Pull crankshaft out from magneto side.

c. Disassembly.

- (1) Using small-nose pliers, remove two piston pinlocks (6, fig. 16) from piston (4).
- (2) Push piston pin (5) out of piston (4), and remove piston from connecting rod.
- (3) Spread piston rings (1, 2, and 3) and remove them from piston.

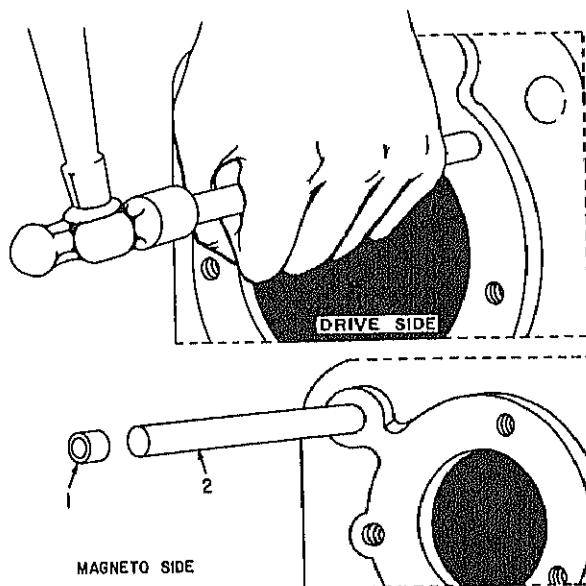
d. Inspection and Maintenance.

- (1) Inspect cylinder walls for scoring, pitting, and for a ridge around top of cylinder bore. If ridge is more than 0.010 inch high or if cylinder bore is scored, pitted, or badly worn, refer to depot maintenance personnel.
- (2) Check the side clearance of the piston rings in the ring grooves. The clearance must be between 0.0025 and 0.004 inch. If beyond these limits, install new rings. If this does not correct the clearance, install a new piston.

Note. Always ream the cylinder before installing a new piston or piston ring.

- (3) Insert the piston rings in the cylinder bore and push them in with the piston

to insure that they describe a true diameter in the bore. Measure the gaps between the ends of each ring. The gap must be between 0.007 and 0.026 inch. If the gap is more than 0.26 inch, install new rings. Always check new piston rings before installing them; the gap may be incorrect owing to wear in the cylinder bore.



1 Expansion plug

2 Camshaft

Figure 17. Removing camshaft.

- (4) Insert the piston in the cylinder bore and check the clearance between the piston and the cylinder. Check this clearance at three points 120° apart around the circumference with a feeler gage. This clearance must be between 0.004 and 0.007 inch. If the clearance with a new piston is greater than 0.007 inch, report to depot maintenance personnel.
- (5) Assemble the piston, piston rings, piston pin, and connecting rod. Test the piston and piston pin by attempting

to move the rod axially in relation to the pin. If any motion can be felt, the piston and piston pin must be replaced. Always replace both piston and piston pin, since these parts are fitted selectively.

- (6) Stone small nicks and scores on piston with a hard Arkansas stone removing only the upstanding metal. Round the edges of small nicks on the piston head with a burnishing tool. Do not polish the piston or use any type of wire brush or abrasive compound. Discoloration need not be removed.
- (7) Inspect the flywheel for scoring, burrs, nicks, or hairline cracks. Replace if defective.
- (8) Inspect connecting rod to see that it is not bent or twisted. Replace if necessary.
- (9) Inspect crankshaft and cam gear and shaft for wear. The minimum allowable diameters are as follows:
 - (a) *Crankshaft.* Magneto journal, 0.8736 inch; drive journal, 0.8736 inch; crankpin, 0.747 inch.
 - (b) *Cam gear.* Camshaft, 0.87185 inch; cam gear lobe 0.867 inch.
- (10) Check cam gear teeth for cracks and breaks.
- (11) Inspect the crankshaft for scoring, burrs, nicks, and excessive wear in the keyways. Check all threads to make sure that they are not stripped, crossed, or otherwise defective. Examine the crankshaft for any evidence of cracks, fractures, or other damage; if it is bent or out-of-round, replace it.
- (12) Check keyways with new keys for wear and spread. Remove burrs from keyway edges to prevent scratching the bearings. If keyways are damaged, replace crankshaft.
- (13) Check crankshaft end play. Install crankshaft and check when engine is cold. End play should be within range of 0.002 to 0.008 inch. Correct to this range if possible; if not, replace crankshaft. End play may be cor-

rected by using one or more of the magneto mounting or bearing support gaskets supplied. These gaskets are supplied in three thicknesses: 0.005, 0.009, and 0.015 inch.

- (14) Inspect valve tappets for wear or damage. Replace if defective.

e. Assembly

- (1) Place piston rings (1, 2, and 3, fig. 16) in proper order on piston. Stagger ring gaps.

- (2) Fasten piston to connecting rod with piston pin (5). Secure piston pin with two piston pinlocks (6).

f. Installation.

- (1) Place magneto brushing (16, fig. 12) and oil seal (15) in magneto plate.

- (2) Place sealed bearing (42, fig. 15) and oil seal (41) in crankcase and fasten with capscrews.

- (3) Install valve poppets (29) on crankcase. Slide camshaft through hole in crankcase on magneto side and through cam gear and cams until it touches crankcase on drive side. (If shaft does not enter easily, inspect for burrs or nicks.)

- (4) Press camshaft in until flush with outside of crankcase on drive side. Install expansion plug (30) with shellac or gasket-sealing compound.

- (5) Slide crankshaft in from magneto side being careful to align marks on gears during disassembly.

- (6) Install magneto mounting gaskets (19, fig. 12) and fasten magneto plate to engine crankcase with four screws and lockwashers. Check crankshaft end play and correct if necessary (par. 26d(18)).

- (7) Install contact point plunger (5, fig. 9), breaker point assembly, and dust cover (par. 22e).

- (8) Install flywheel.

- (a) Place keyway of crankshaft up and place key (12, fig. 16) in keyway. Put flywheel on shaft and align keyway of flywheel with key. Push flywheel securely in place.

- (b) Place pulley (13) and screen assembly (14) on shaft. Lock them onto crankshaft with flywheel washer (15) and nut (16). Make certain that concave side of washer is down.
- (c) Place a block of wood under left side of flywheel and draw nut up tight with wrench by turning counterclockwise.
- (d) Install blower housing (par. 22e (7)).
- (9) Slide piston and connecting rod assembly into cylinder bore as far as first ring. Use a conventional piston ring compressing tool and clamp rings until they are flush with piston. With engine turned on side, slide piston and connecting rod assembly into cylinder bore.
- (10) Fasten connecting rod to crankshaft by positioning connecting rod dipper (9) and connecting rod lock (8) cor-

rectly. (Dipper will not dip oil if it is installed incorrectly.) Fasten dipper and lock in place with two connecting rod screws (18).

- (11) Install engine base.
- (a) Insert new engine base gasket (32, fig. 15).
- (b) Guide cylinder into proper position by sliding it into two engine base pins (33).
- (c) Fasten cylinder to engine base with cylinder mounting washers (28 and 36), two lockwashers (27 and 37), and two cylinder mounting screws (26 and 38).
- (d) Replace drain plug (35) and fill crankcase with proper grade oil (TM 3-4240-207-12).
- (12) Install cylinder head (par. 24d).
- (13) Install carburetor (par. 21g).
- (14) Install air cleaner (par. 20d).
- (15) Install blower (par. 10).

Section IV. ELECTRIC MOTOR GROUP

27. Description

The ABC-M6 electric-motor-driven filter unit is powered by a 1-horsepower general-purpose motor (fig. 18), which operates on 115- or 230-volt 60-cycle single-phase alternating current and has a continuous rating of 3,450 revolutions per minute. It has a starting capacitor equipped with a centrifugal switch and is lubricated by sealed sleeve bearings having oil seal gaskets. The bearings have a safe temperature rise of 40° C. The fan of the blower is connected directly to the shaft of the electric motor.

28. Functioning

The electric motor is a capacitor-start motor that supplies the necessary torque to operate the blower fan.

29. Removal and Disassembly

Note. Disassembly of the electric motor will be confined to the operations listed in *d* and *e* below. Replacement of components other than those indicated is not authorized.

a. Removal of Inlet Group, Outlet Group, and Elbow Coupling. Follow directions given in paragraphs 18*a* and *b*.

b. Removal of Motor.

- (1) Remove blower (par. 7).
- (2) Remove four capscrews (2, fig. 18), lockwashers (13), and nuts (12) freeing motor (6).
- (3) Remove motor.

c. Removal of Motor Base. Remove two nuts (12, fig. 3) and flat washers (11), which fasten motor base to the canister. Remove motor base. (Be sure to remove plug connector from power source.)

Note. When certain maintenance procedures permit the removal of the motor and blower as a single unit omit procedures described in step *b* and proceed with step *c*.

d. Removal of Capacitor.

- (1) Remove four nuts and bolts (1, fig. 18), releasing the end bell (18) from the stator housing (6). Tap the end bell lightly with a soft-faced hammer and pry the end bell from the stator housing with a screwdriver.

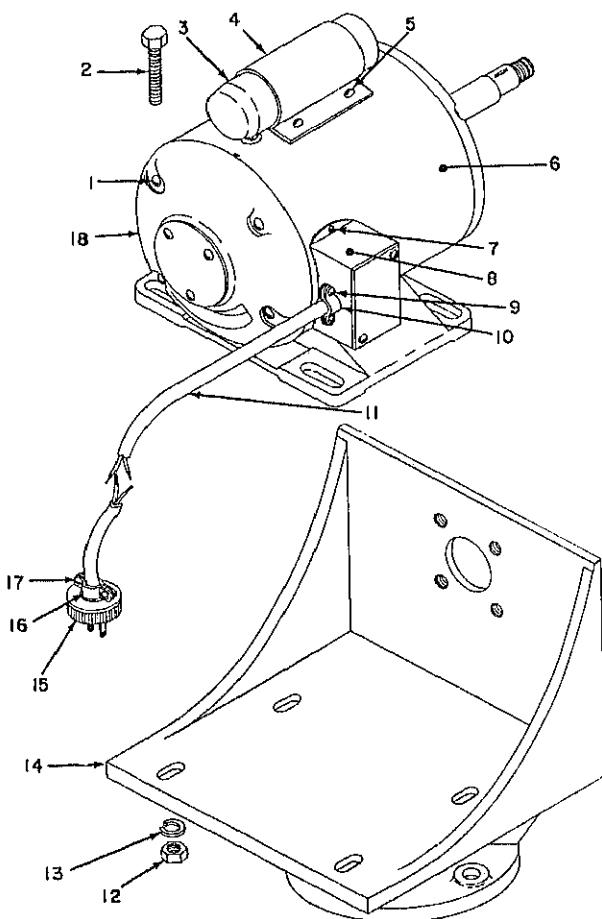
- (2) Unscrew one capacitor lead from end bell (18) and unsolder the other from connecting lead. Tag connecting lead.
- (3) Remove two screws (5), releasing capacitor clip (4) from stator housing.
- (4) Pull capacitor leads through hole in stator housing.
- (5) Separate capacitor (3) from capacitor clip; retain capacitor clip.

e. Removal of Plug Connector and Power Cable.

- (1) Loosen two screws (17), releasing cable clamp (16) at plug connector (15).
- (2) Remove fiber insulating disk from plug.
- (2) Loosen two terminal screws on plug, releasing cable leads.
- (4) Slide plug and cable clamp off cable (11).
- (5) Loosen two screws (9), releasing cable clamp (10) at terminal box (8).
- (6) Remove two screws (7), releasing terminal box from stator housing.
- (7) Remove two conductor splices (screw-type connectors) exposing eight leads. Tag all leads to insure correct re assembly.
- (8) Separate two cable leads from other leads and pull cable through terminal box.

30. Inspection and Maintenance

- a. Inspect the end bells and stator housing for cracks or breaks. If damaged, replace motor.
- b. Inspect motor base for cracks or breaks. Replace if damaged.
- c. Inspect wires for breaks, for cracked or frayed insulation, and for loose connections. If wires must be spliced, solder and tape the connection. To repair connections, resolder or tighten terminal screws.



- 1 Through bolt
- 2 Capscrew
- 3 Capacitor
- 4 Capacitor clip
- 5 Screw
- 6 Motor (stator housing)
- 7 Screw
- 8 Terminal box
- 9 Screw
- 10 Cable clamp
- 11 Cable
- 12 Nut
- 13 Lockwasher
- 14 Motor base
- 15 Plug connector
- 16 Cable clamp
- 17 Screw
- 18 End bell

Figure 18. Electric motor and motor base.

- d. If motor would not start, capacitor (3) may be damaged. Replace capacitor.

31. Assembly and Installation

a. Installation of Power Cable and Plug Connector.

- (1) Insert leads of cable (11, fig. 18) through cable clamp (10) and into opening in terminal box (8) and pull through.
- (2) Remove tags from leads and twist each cable lead to the correct three motor leads. Screw on connector splices.
- (3) Attach terminal box to stator housing (6) with two screws (7).
- (4) Fasten cable clamp securely at terminal box with two screws (9).
- (5) Insert free end of cable through cable clamp (16) and plug connector (15).
- (6) Twist one cable lead around each terminal on plug and tighten terminal screws.
- (7) Install fiber insulating disk on plug.
- (8) Fasten cable securely at plug with two screws (17).

b. Insulation of Capacitor.

- (1) Insert capacitor (3) in capacitor clip (4).
- (2) Insert capacitor leads in hole in stator housing and pull leads through.
- (3) Fasten capacitor clip to stator housing with two screws (5).
- (4) Remove tag from connecting lead; splice, solder, and tape one capacitor lead to it. Connect other capacitor lead to terminal on end bell (18) and tighten screw.
- (5) Install the end bell on housing and tap lightly with a soft-faced hammer. Install four through bolts (1) and nuts, and tighten.

c. Installation of Motor Base.

Position motor base (14) on canister and secure with two flat washers (11, fig. 3) and nuts (12).

Note. If motor and blower were removed as a single unit (par. 29c), omit step d below.

d. Installation of Motor.

- (1) Place motor on motor base.
- (2) Secure motor to motor base with four capscrews (2, fig. 18), lockwashers (13), and nuts (12).
- (3) Install blower (par. 10).

Section V. INLET GROUP

32. Description

Refer to TM 3-4240-207-12.

33. Removal and Disassembly

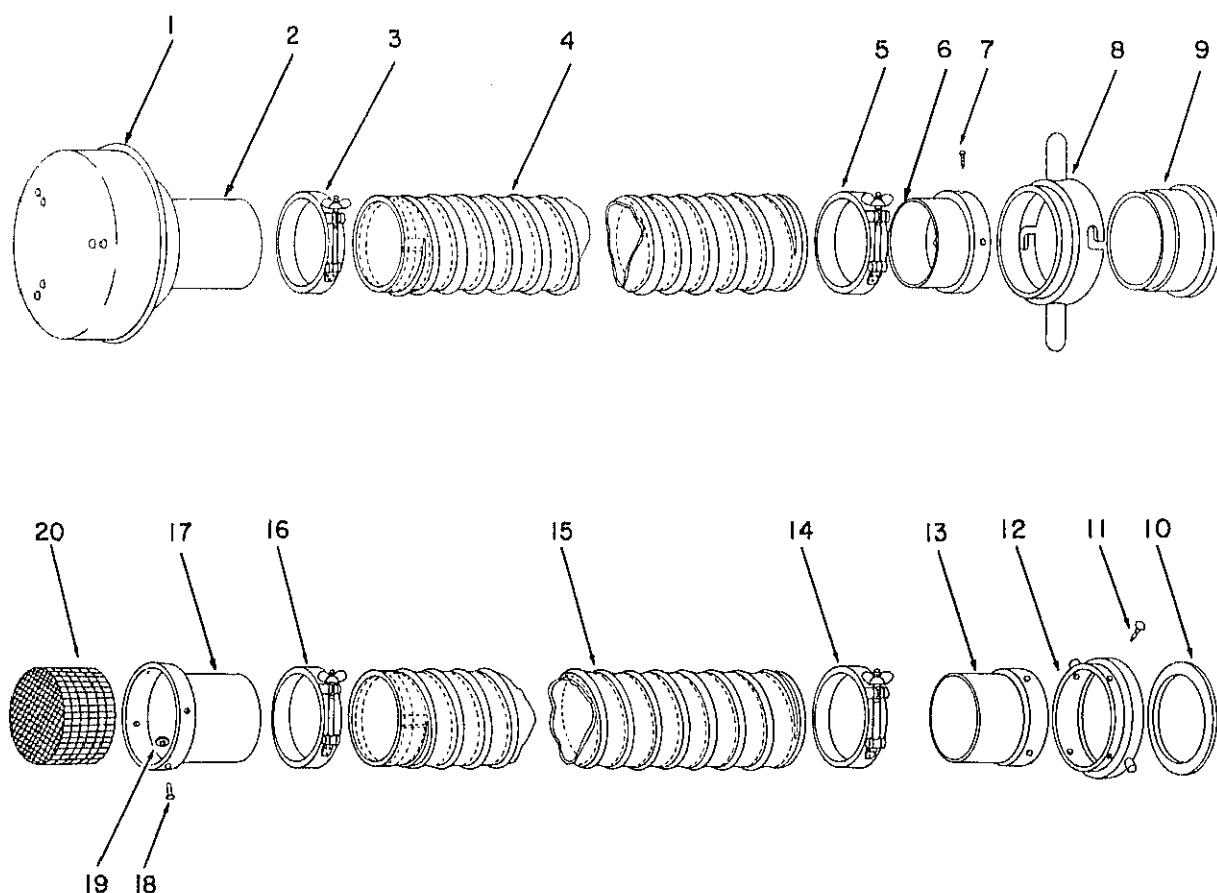
- a. Remove inlet group as described in TM 3-4240-207-12.
- b. Loosen T-bolt clamps (3, fig. 18) and (5). Remove cover (1) and hose adapter (2) from hose. Remove clamps (3 and 5).
- c. Remove drivescrews (7) that fasten locking coupling tube (9) to hose adapter (6). Remove locking coupling tube (9) and locking coupling (8).

34. Inspection and Maintenance

- a. Inspect hose for chafing or tearing. If hose damage is not serious, repair using Vulcalock rubber adhesive.
- b. Inspect T-bolt clamps (3 and 5, fig. 19) for wear, bends, or damaged threads. Replace if necessary.
- c. Clean old cement from mating surfaces of locking coupling tube (9) and hose adapter (6). Inspect locking coupling (8) and locking coupling tube (9) for bends and dents or other signs of damage. Replace if necessary.

35. Assembly and Installation

- a. Insert locking coupling tube (9, fig. 19) through locking coupling (8). Coat mating



1 Cover	11 Drive screw
2 Hose adapter	12 Connector
3 T-bolt clamp	13 Hose adapter
4 Hose	14 T-bolt clamp
5 T-bolt clamp	15 Hose
6 Hose adapter	16 T-bolt clamp
7 Drivescrew	17 Hose adapter
8 Locking coupling	18 Rivet
9 Locking coupling tube	19 Flat washer
10 Gasket	20 Screen

Figure 19. Inlet and outlet group.

surfaces of locking coupling tube and hose adapter with Permatex No. 2 gasket cement.

b. Insert locking coupling tube into mating end of hose adapter being careful to align drivescrew holes.

c. Secure with four drivescrews (7). Remove excess cement from joint.

d. Place T-bolt clamps (3 and 5) onto their respective hose adapters (2 and 6). Slide hose over hose adapters and secure with T-bolt clamps.

e. Install as described in TM 3-4240-207-12.

Section VI. OUTLET GROUP

36. Description

Refer to TM 3-4240-207-12.

37. Removal and Disassembly

- a. Remove outlet group as described in TM 3-4240-207-12.
- b. Loosen T-bolt clamps (14, fig. 19) and (16). Remove hose (15) from hose adapters (13 and 17). Remove clamps (14 and 16).
- c. Remove drivescrews (11) that fasten connector (12) to hose adapter (13).
- d. Remove gasket (10) from connector with a screwdriver or some other blunt object.
- e. Remove flat washers (19) and rivets (18) that fasten screen (20) to hose adapter (17).

38. Inspection and Disassembly

- a. Inspect hose (15, fig. 19).
- b. Inspect T-bolt clamps (14 and 16) (par. 34b).

c. Inspect screen for large holes and bends. If screen is damaged, replace.

d. Inspect connector (12) for bends, nicks, and breaks. Replace if damaged. Always replace gasket (10) when old gasket is removed.

e. Replace drivescrews (11), rivets (18), and flat washers (19) if necessary.

39. Assembly and Installation

a. Fasten screen (20, fig. 19) to hose adapter (17) with flat washers (19) and rivets (18).

b. Cement gasket (10) in connector using general purpose synthetic hose cement.

c. Fasten connector (12) to hose adapter (13) with four drivescrews (11).

d. Place T-bolt clamps (14 and 16) onto hose adapters (13 and 17). Slide hose over hose adapters and secure with T-bolt clamps.

e. Install as described in TM 3-4240-207-12.

CHAPTER 3

DEPOT MAINTENANCE INSTRUCTIONS—FIFTH ECHELON

Section I. BLOWER GROUP

40. Description

The blower group is described in paragraph 5.

41. Removal and Disassembly

Disassemble blower and remove left and right casings (par. 8).

42. Inspection and Maintenance

Clean left and right casings and inspect for cracks and other signs of damage. Weld all

cracks and machine mating surfaces of casings. Grind welded seams on inside of casing to allow proper clearance for blower wheel. Paint repaired parts. Refer to TM 9-2851 for methods and materials to be used in painting.

43. Assembly and Installation

Assemble and install blower (par. 10).

Section II. CANISTER GROUP

44. Description

The canister is described in TM 3-4240-207-12.

45. Removal and Disassembly

- a. Follow removal instructions given in paragraph 18.
- b. Remove engine (par. 18d(2)(a)) or motor and motor base (par 29c).
- c. Disassemble canister removing manifolds and filters as described in paragraphs 14a through e.
- d. Remove four drivescrews (11, fig. 2) that fasten locking coupling tube (10) to elbow. Remove locking coupling tube (10) and locking coupling (12).

46. Inspection and Maintenance

a. Clean all parts with dry-cleaning solvent. Remove old cement from mating surfaces of locking coupling tube and elbow.

b. Inspect elbow coupling and top, intake, and bottom manifolds from cracks, nicks, or scoring. Weld all cracks and machine mating surfaces of manifolds if repairable; otherwise, replace. Paint all repair parts in accordance with TM 9-2851.

47. Assembly and Installation

Assemble and install canister (pars. 16 and 17).

Section III. ELECTRIC MOTOR GROUP

48. Description

Description and functioning of the electric motor is described in paragraphs 27 and 28.

49. Removal

- a. Remove inlet group, outlet group, and elbow coupling (pars. 13a and b).
- b. Remove motor (par. 29b).
- c. Remove motor base (par. 29c).

50. Inspection and Maintenance

Inspect motor base (14, fig. 18) for cracks and breaks. Weld all cracks and breaks. Grind down welded seams if required for base to function properly. Paint base in accordance with the instructions contained in TM 9-2851.

51. Installation

- a. Install motor base (par. 31c).
- b. Install motor (par. 31d).
- c. Install inlet group, outlet group, and elbow coupling (par. 17).

Section IV. GASOLINE ENGINE GROUP

52. General

This section covers instructions for repair of items beyond the capabilities of field maintenance personnel. Instructions include disassembly as required for a complete overhaul. For reference during overhaul, a table of limits outlining critical dimensions and tolerances for various parts of engine is included in paragraph 4d.

machining as required. Check all parts for crossed threads and retap holes if necessary. If base is not repairable, replace.

53. Description

The gasoline engine is described in paragraph 18a.

d. Inspect oil spray shield (20) and cylinder shield (44) for bends or breaks. Be sure cylinder shield fits snugly around cylinder block to enable proper cooling of engine.

54. Removal

Follow all removal procedures described in paragraph 18d.

e. Inspect condition of exhaust valve seat (5). If valve seat is burned or pitted, drive valve seat out being careful not to damage block. Discard valve seat. Before installing new valve seat, pack in dry ice, and heat block for 20 minutes. Insert seat in exhaust valve seat opening in block and hold in place until temperatures of the seat and block equalize. Seat valve and seat (par 25d).

55. Disassembly

Disassemble engine following procedures described in paragraph 18d(3).

f. Inspect magneto plate (5, fig. 10) for nicks, cracks, or breaks. Also check for proper fitting of bushing (16, fig. 12) and seal (15). If magneto plate is defective, replace.

56. Inspection and Maintenance

- a. Clean all parts with dry-cleaning solvent.
- b. Inspect engine stand (26, fig. 4) for cracks or breaks. Repair by welding. Machine or grind weld if required.
- c. If engine base (39, fig. 15) is cracked, nicked, or scored, repair by welding or

g. Inspect bearing (42, fig. 15) for excessive wear. If bearing is defective, replace.

h. Inspect walls of cylinder block (43) (par. 26d(1)). Ream cylinder if necessary. Always ream the cylinder before installing new piston or piston rings. Check clearance between piston and cylinder wall (par. 26d(4)). If clearance is too large, replace cylinder block.

57. Assembly

Assemble engine following procedures described in paragraph 18f.

58. Installation

Follow all installation procedures described in paragraph 18f.

APPENDIX I**REFERENCES**

TM 3-4140-207-12 Operator and Organizational Maintenance Manual, Filter Unit, Gas-Particulate, 300 CFM, GED, ABC-M6 and Filter Unit, Gas Particulate, 300 CFM, EMD, ABC-M6.

TM 3-4240-207-35P Field and Depot Maintenance Repair Parts and Special Tool Lists for Filter Unit, Gas-Particulate, 300 CFM, GED, ABC-M6 and Filter Unit, Gas-Particulate, 300 CFM, EMD, ABC-M6.

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NG: State AG (3); TOE Units 7-2, 17-2 (1).

USAR: Same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-50.

